RAILROAD GAZETTE

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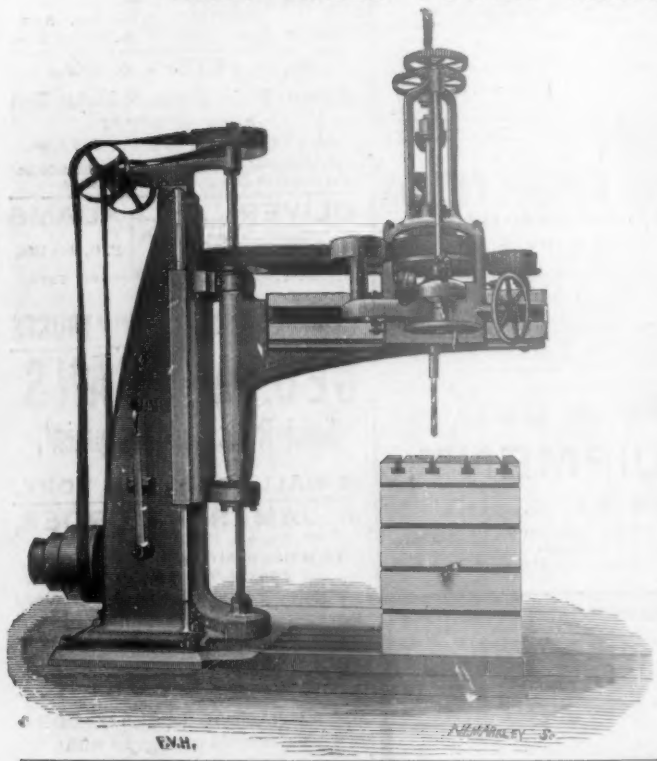

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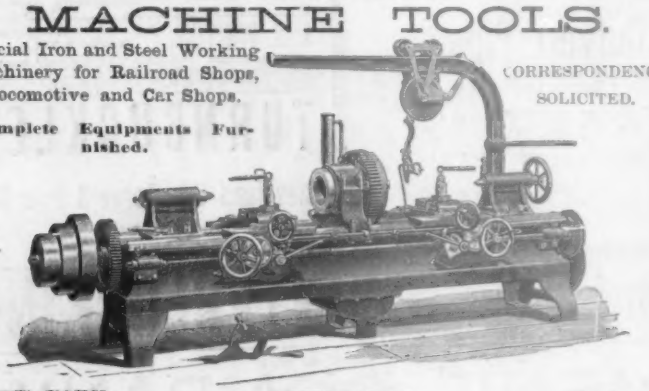

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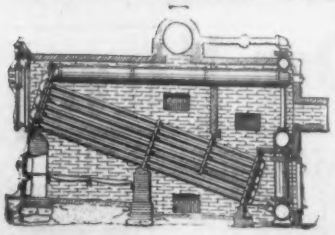

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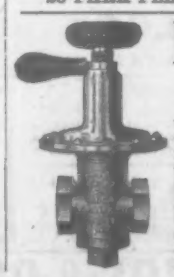

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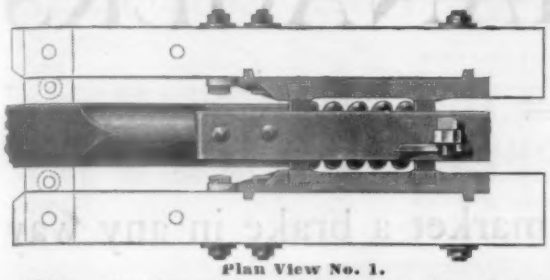

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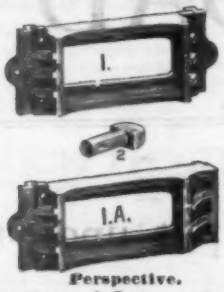

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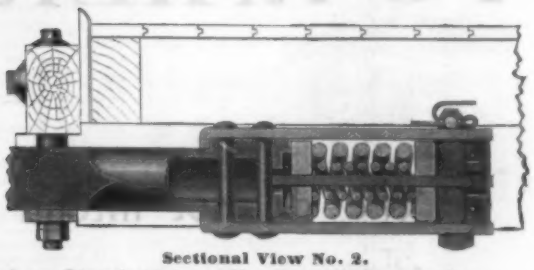

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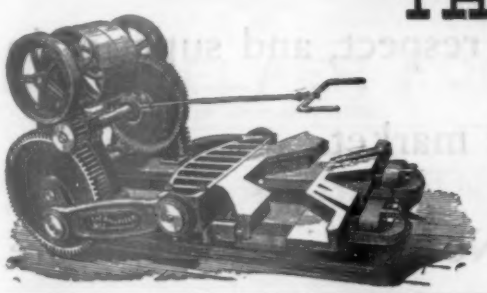

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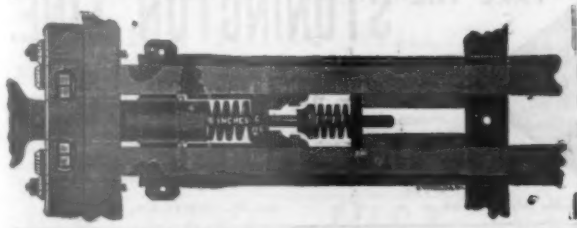

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J. S. Mundy, Newark, N. J.
Vulcan Iron Works, Chicago.
Hollow Stay Bolt Iron
Falls Hollow Stay Bolt Co., Cuyahoga Falls, O.
Hydraulic Jacks
Richard Dudgeon, 24 Columbia St., N. Y.
Joseph F. McCoy Co., 26 Warren St., N.Y
Watson & Stillman, 210 E. 43d St., N. Y
Hydraulic Machinery
Tinius Olsen & Co., Philadelphia, Pa.
Union Iron Works, San Francisco.
Watson & Stillman, N. Y. City.
R. D. Wood & Co., Philadelphia, Pa.
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Nathan Mfg. Co., 94 Liberty street, N. Y.
Wm. Sellers & Co., Philadelphia.
Inspectors
Pittsb. Test. Laboratory, Pittsb., Pa.
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R. W. Hildreth & Co., 2 Wall St., N. Y.
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Nat. Switch & Signal Co., So. Bethlehem, Pa
Union Switch & Signal Co., Pittsburgh.
Wharton R. R. Switch Co., Phila.
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B. M. Jones & Co., Boston, Mass.
Iron Work for Contractors
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King Bridge Co., Cleveland, O.
Iron & Steel Ship Builders
Union Iron Works, San Francisco.
Jacks
Fairbanks, Morse & Co., Chicago.
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Watson & Stillman, 210 E. 43d St., N. Y.
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D. A. Hopkins Mfg. Co., 143 Liberty St. N.Y.
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Paul S. Reeves, Philadelphia, Pa.
Journal Bearings—Tubular
Menseely Bearing Co., W. Troy, N. Y.
Journal-Box Lids
Ramapo (N. Y.) Wheel & F'dry Co.
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Adams & Westlake Co., Chicago.
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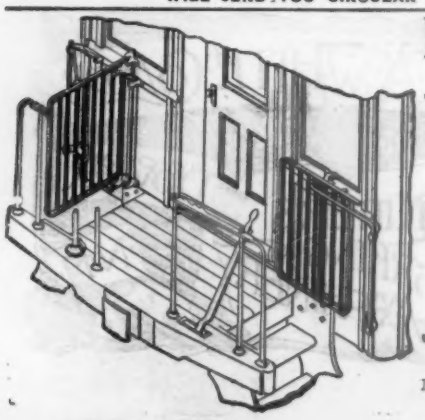

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Lima Machine Works, Lima, O.
A. S. Males & Co., Cincinnati, O.
N. Y. Equipment Co., 15 Wall St., N. Y.
Pittsburgh Loco. & Car W'ks, Pittsburgh.
H. K. Porter & Co., Pittsburgh, Pa.
Portland Co., Portland, Me.
Richmond (Va.) Loco. & Mach. Works.
Rogers Loc. & Mach. W'ks., Paterson, N.J.
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Tuite & Carlton, London, Eng.
Wharton R. R. Switch Co., Phila.

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Flood & Conklin, Newark, N. J.

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Adams & Westlake Co., Chicago.
Nat. Elect. Headlight Co., Indianapolis.

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N. Y. Equipment Co., 15 Wall St., N. Y.

Locomotive Staybolt Iron
Falls Hollow Staybolt Co., Cuyahoga Falls, O.

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Nathan Mfg. Co., 92 Liberty street, N. Y.

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Gould & Eberhardt, Newark, N. J.
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Long & Allstatter Co., Hamilton, O.
Manning, Max. & Moore, 111 Liberty St.,
Morse Tw. Dr. & Mach. Co., N. Bed'd, Mass.
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National Mall. Castings Co., Cleveland.

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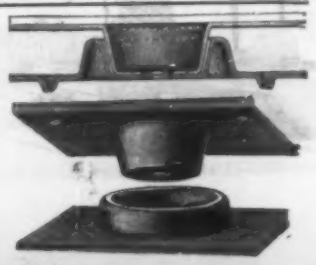

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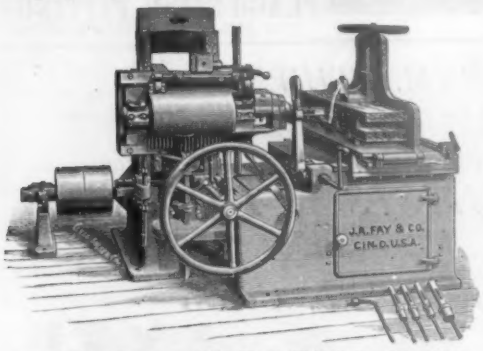

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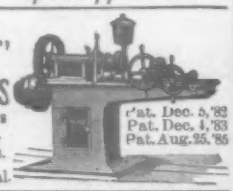

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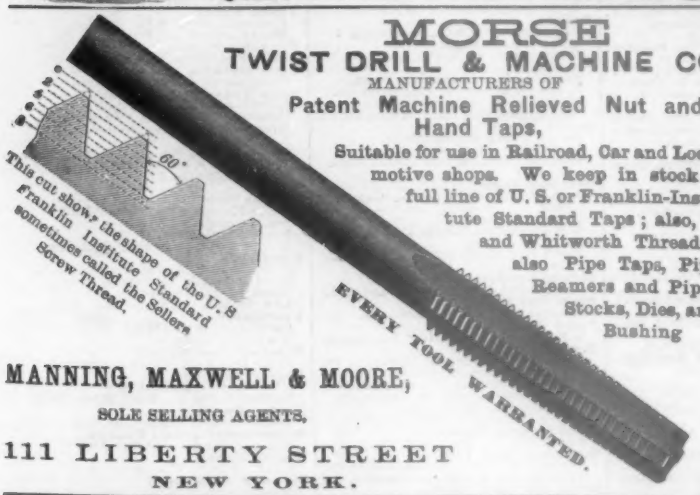
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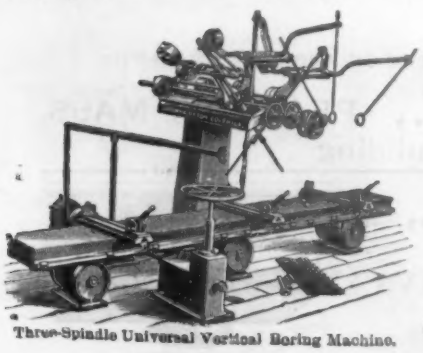

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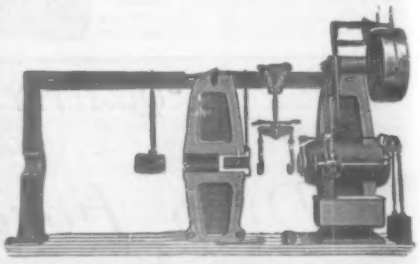

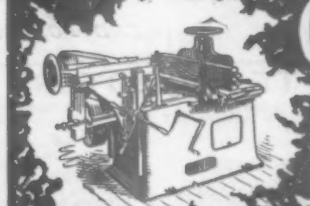

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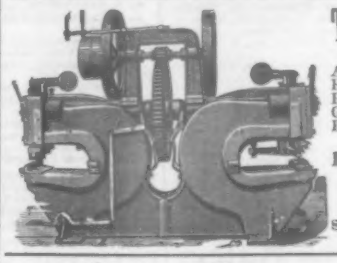

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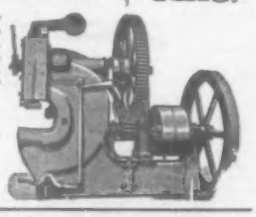

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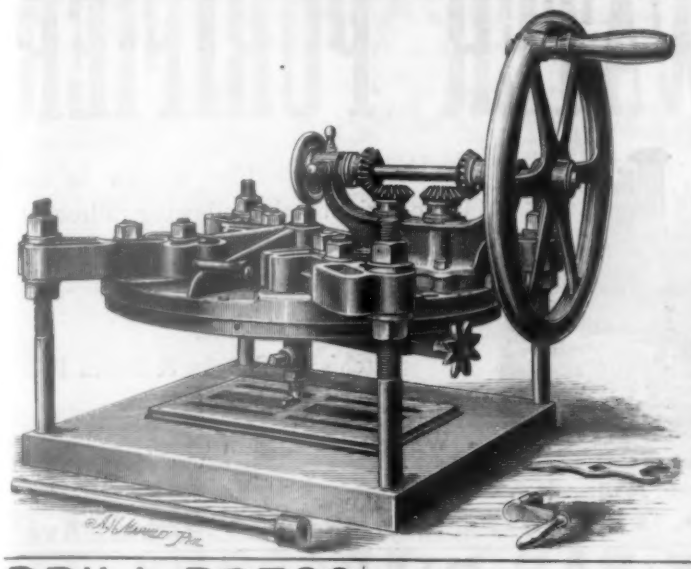

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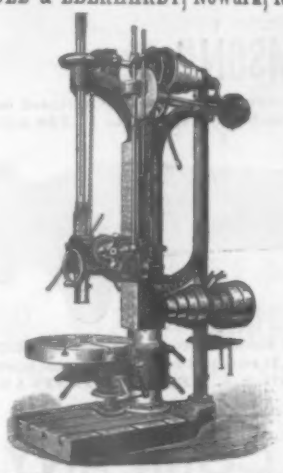

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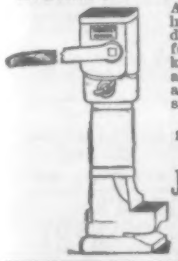

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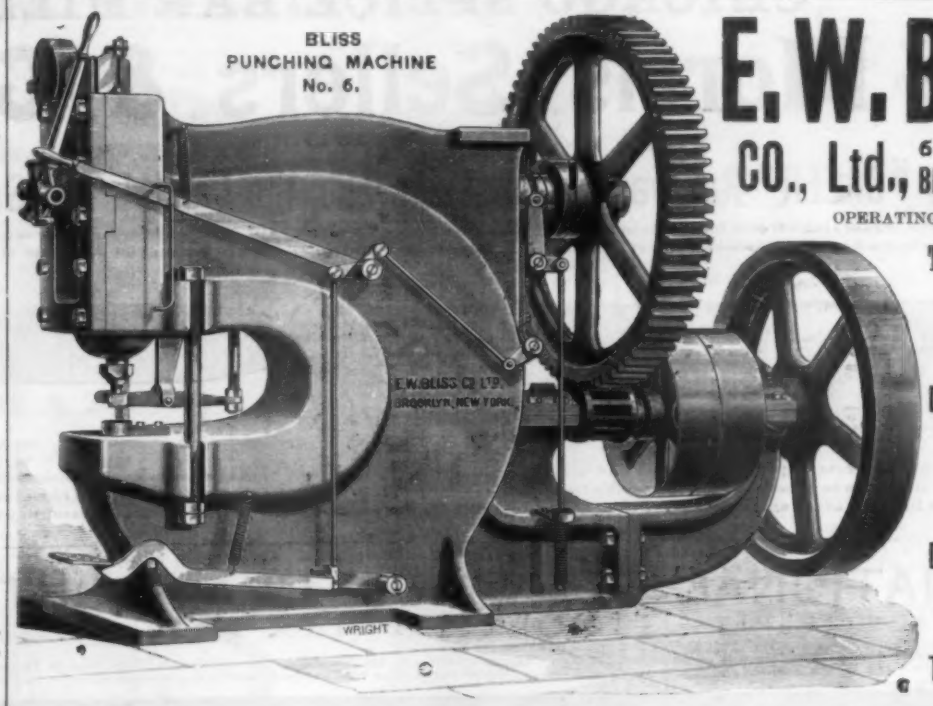

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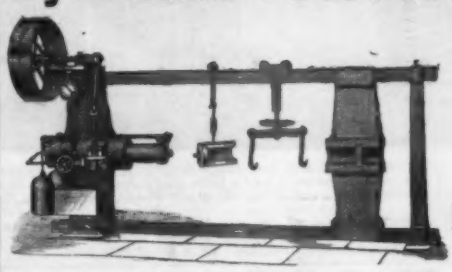

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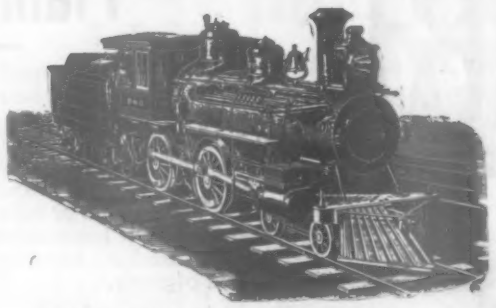

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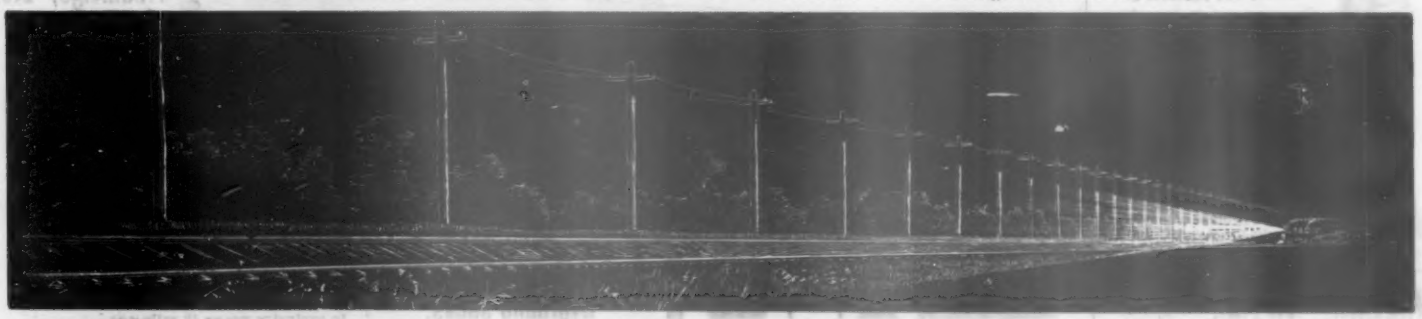

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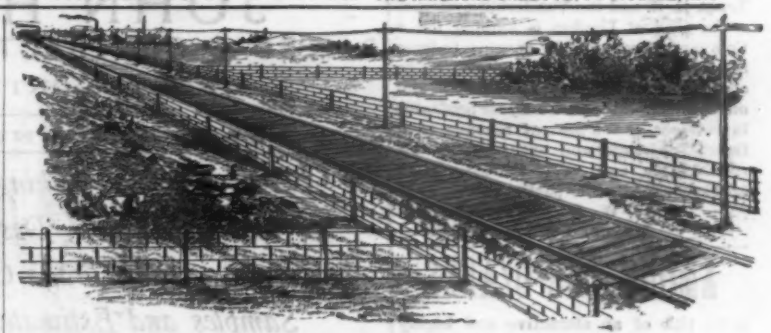

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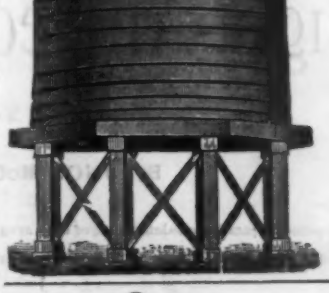

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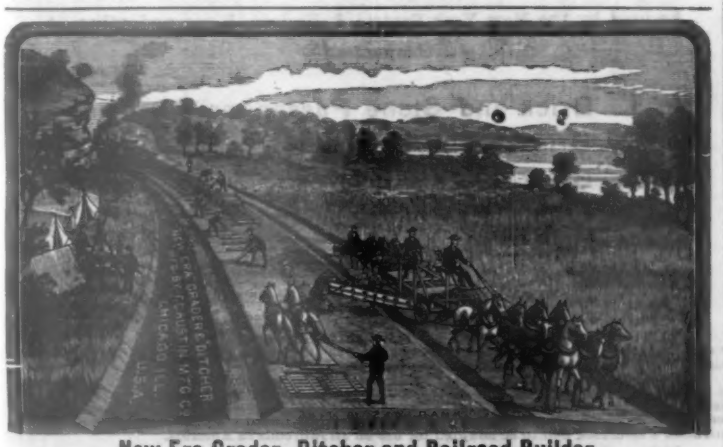

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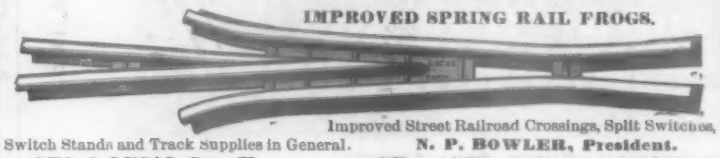

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VI. Special rates and their relation to commerce.
VII. Necessity and value of Traffic agreements.
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IX. Railway rates and government control. Railway growth in the United States. Present status. Methods of railroads. The limits within which legislative interference is valuable.
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XV. Cost of railroads not fully capitalized; the reasons why; effect on rates.
XVI. Local and through traffic; State *versus* interstate traffic; impossibility of distinguishing one from the other; effect on legislative action.
XVII. Moderation exercised by wise governments in meddling with the rates of railways and in exercising their police powers; the reasons therefor. The status of railroads in England, Canada, Australia, Germany, France, Austria-Hungary, Belgium, Spain and Portugal, Italy, Russia and Japan.

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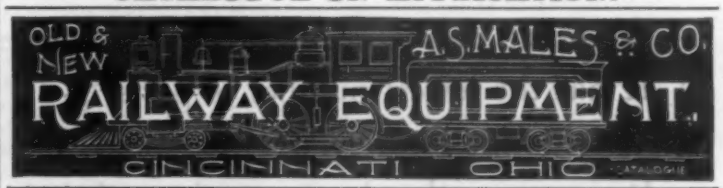

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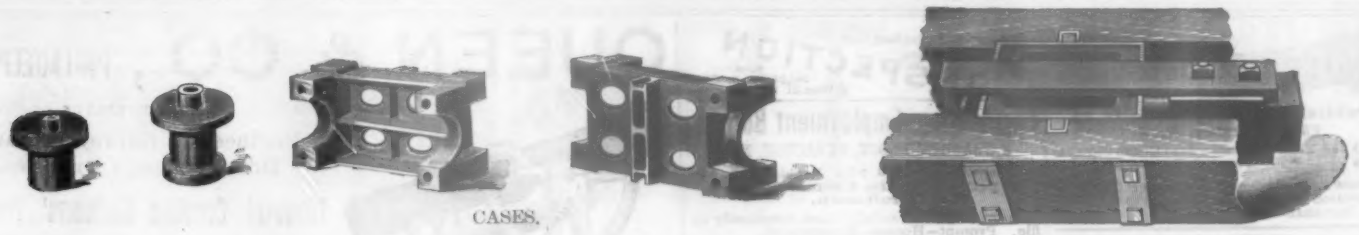

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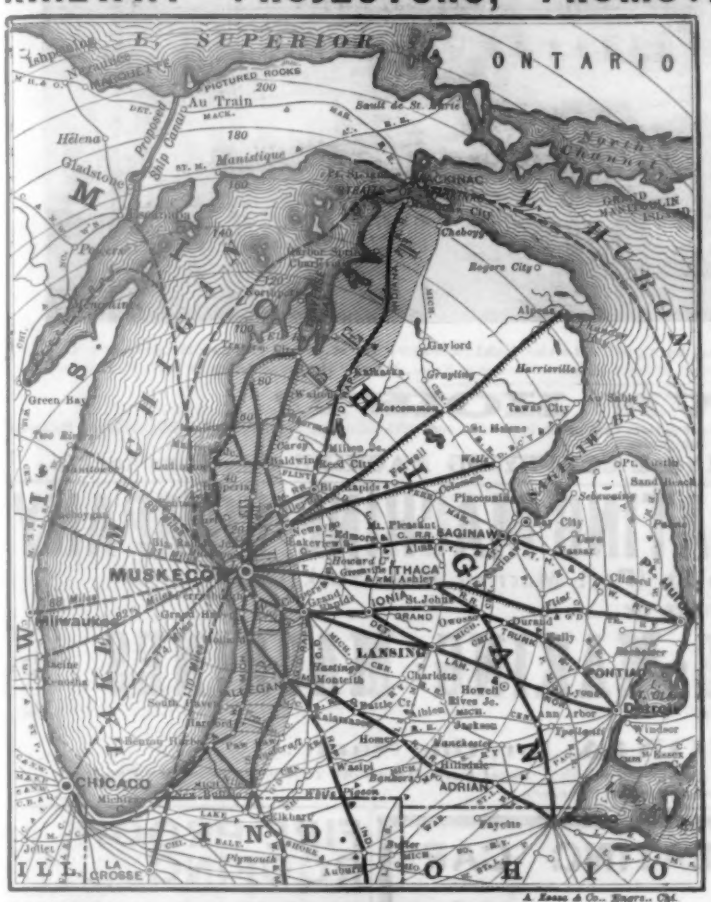

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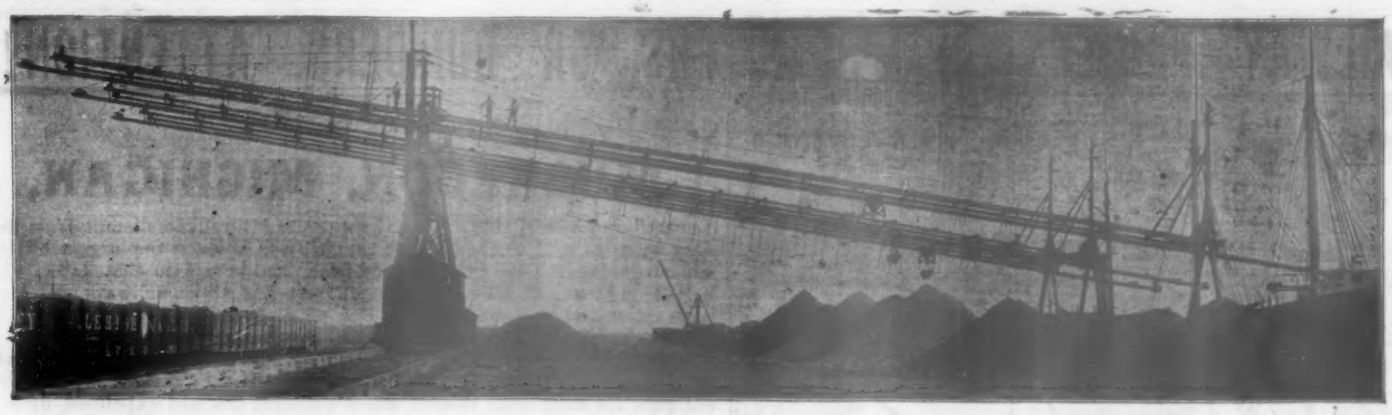

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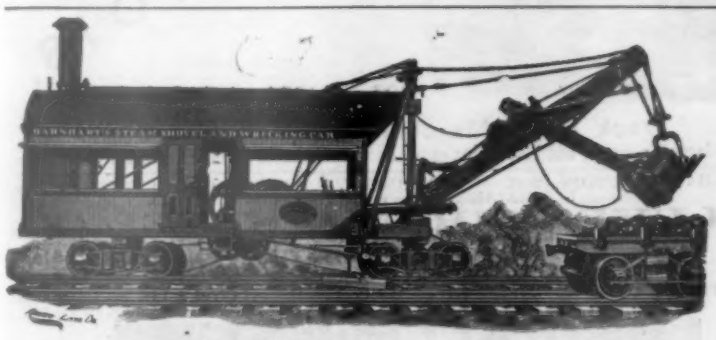

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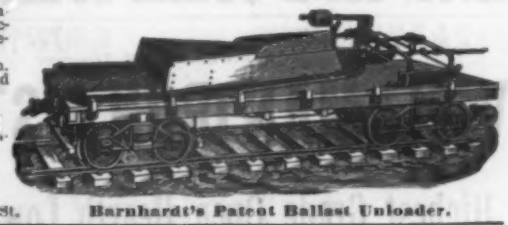

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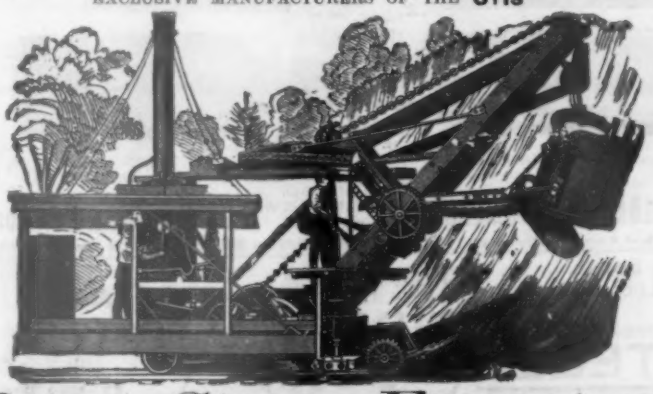

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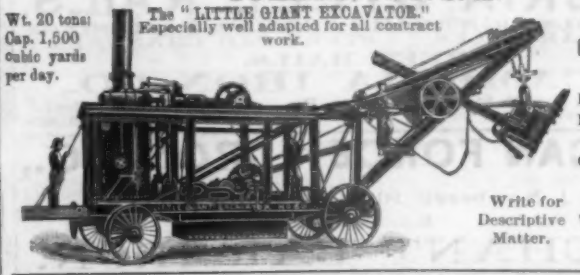

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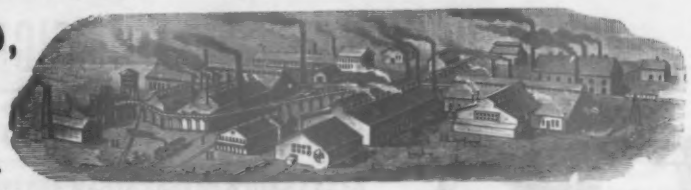

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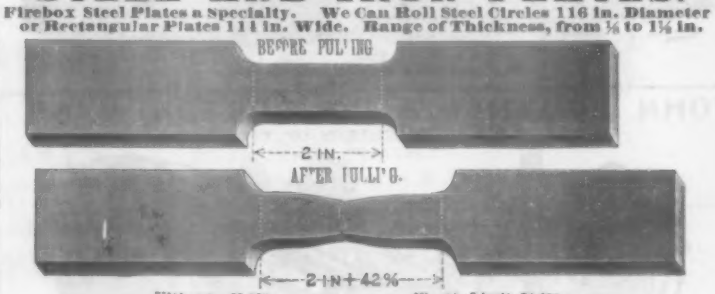

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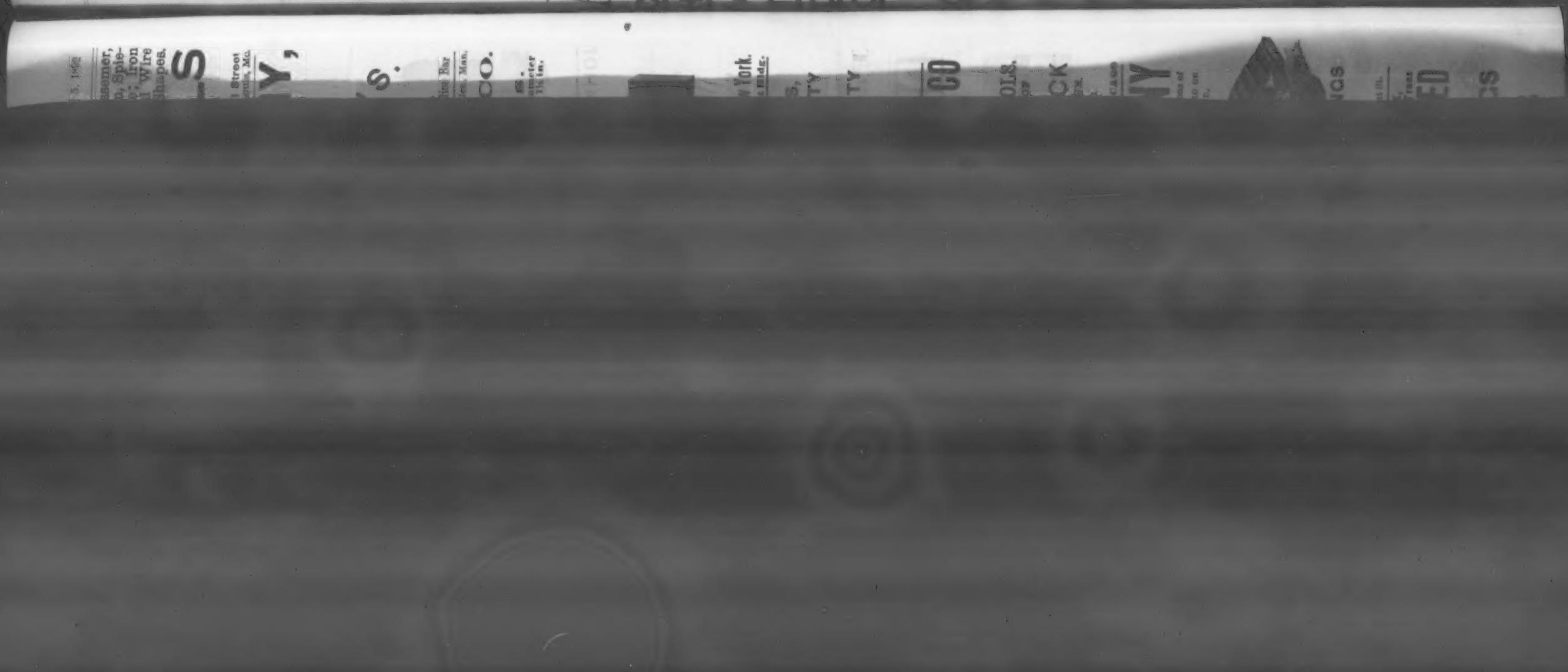

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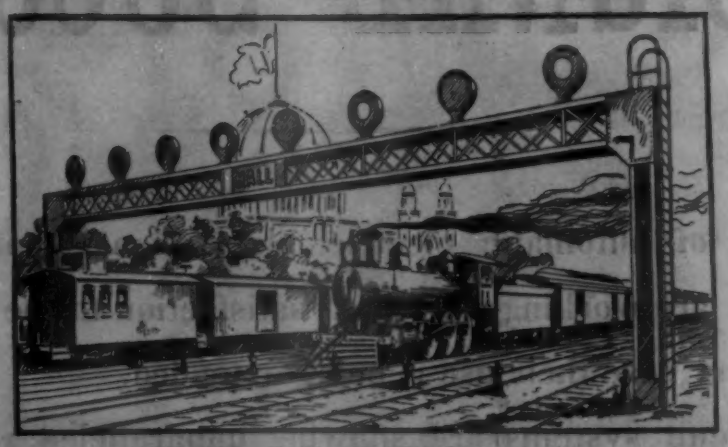

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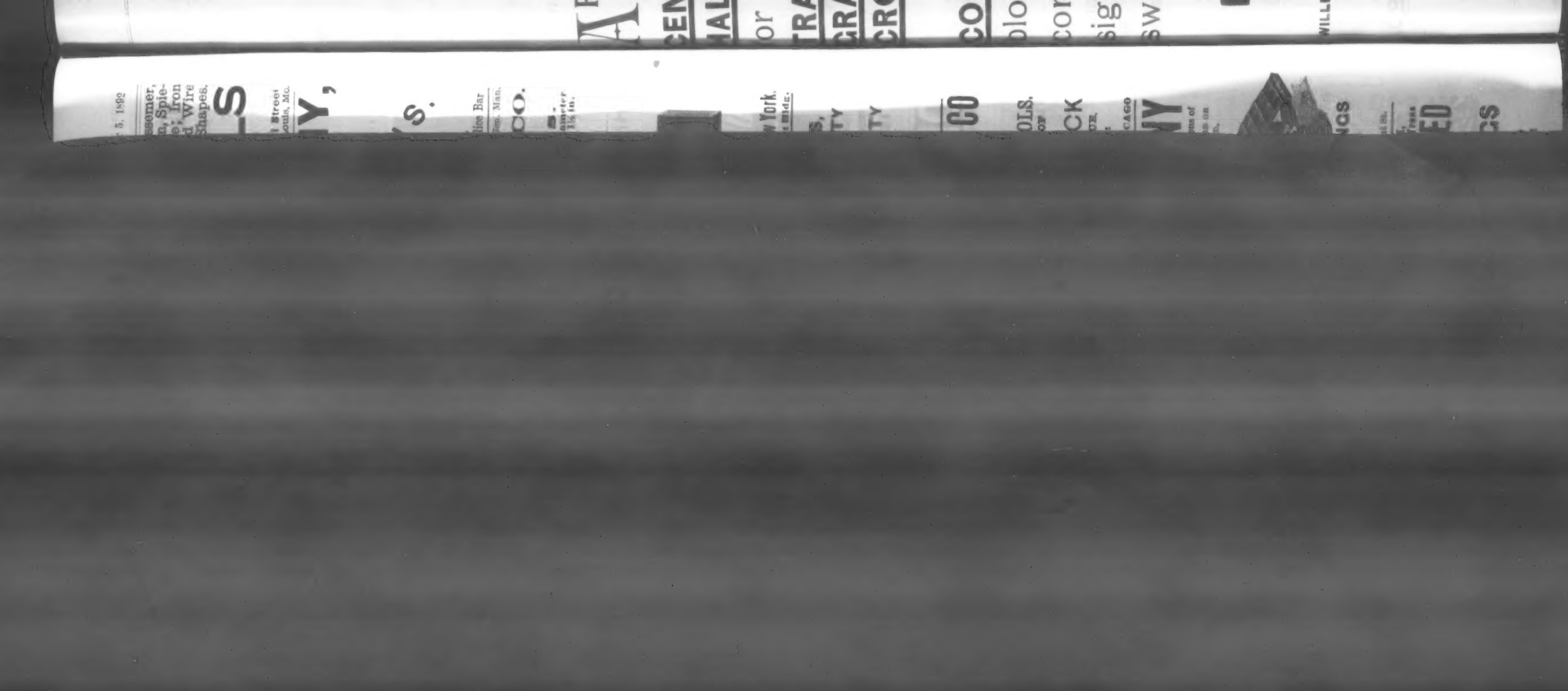

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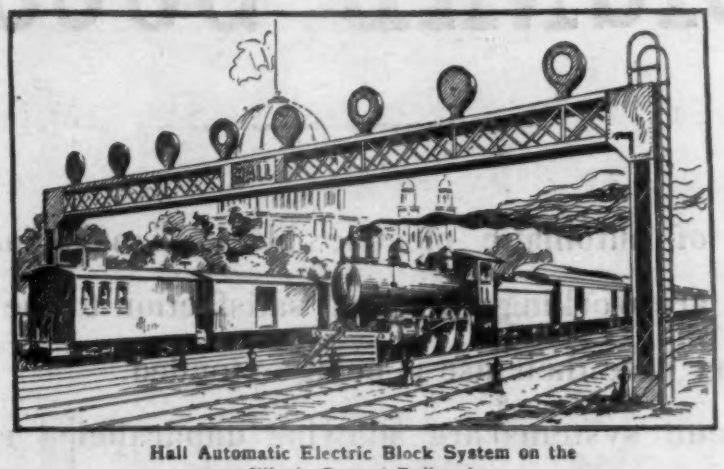

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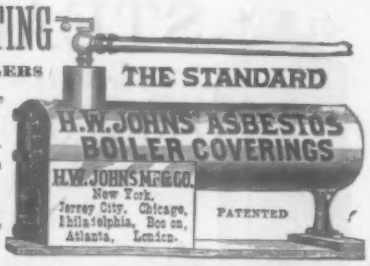

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RAILROAD GAZETTE

FRIDAY, AUGUST 5.

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Contributions.

The British Board of Trade and Accidents.

TO THE EDITOR OF THE RAILROAD GAZETTE:

You say you have heard the inspectors of the Board of Trade criticised for "blaming as many persons as possible for each accident." From what I was able to gather while over there recently, they are open to the further criticism of not being able to keep their hands off the business. In fact, I got a pretty strong impression that, like a quack doctor, without much acquaintance with the disease or with the remedies, without any considerable ability to diagnose a case, and with but little acquaintance with the constitution and habits of the patient, they felt themselves under obligations to prescribe something strong anyhow, and that the prescriptions were more likely than not to be purely empirical.

Against the protests of the railroads, the Board of Trade forced on them, at enormous expense, the block signaling and interlocking, neither of which, to my mind, reflect, in their installation, very great credit; and now they are compelling the Highland Railway, of Scotland, to stop operating under the crossing orders it has been successfully using for many years, and to introduce the ridiculous and cumbersome staff system. There seems to be a great straining after "theoretical safety" regardless of cost and regardless of practical effects, and this is clearly understood and endured by the railroad managers, and clearly understood and protested against by men like W. M. Acworth and J. S. Jeans. As long ago as 1867 the Royal Commissioners pointed out that "it was the tendency of government inspection to seek to multiply accessories to safety; these accessories are more or less valuable, according to the condition of the traffic on a line and the manner in which it is worked. So long, therefore, as those who control the traffic are free to accept or reject the government recommendations, it is very desirable that they should be made. But the more such appliances are multiplied the greater are the chances of danger from their neglect or their failure to act, though the chances of danger are diminished or increased according to the character of the men who use them. The selection of the men must always rest with the manager, and he should, therefore, remain reponsible for the selection of the appliances for safety which he places in their hands."

The fault I find with the Board of Trade is that many of its recommendations are not judicious, and that, contrary to the advice of the Royal Commissioners, it does not confine its action to recommendations which those who control the roads are free to accept or reject.

SUPERINTENDENT.

[It is true that an extreme view would hold that all government regulation of technical details is wrong, and that no inspecting officer without long experience in actual railroad operation could possibly make right decisions on questions of railroad management; but the testimony of English railroad officers has often been in favor of the Board's methods. The inspecting officers' prescriptions are strong, but do they punish employés more severely than American superintendents do? Do they require more of the companies than every General Manager would require of his own directors?

The most practical criticism of the Board is that it has ordered expensive improvements before the companies have raised the necessary funds; but we believe that the improvements have been such as will prove economical eventually. The enforcement of the block system cannot produce any very serious stress on the companies' treasuries, for some 80 or 90 per cent. of the mileage was blocked already. And we cannot believe that the companies are sorry that they have this existing equipment. A prominent official of the London & Northwestern told us that before the adoption of the block system rear collisions were very frequent, and that since its adoption they are "almost unknown." The enforcement of the block system is a comparative matter after all, and the Government may possibly err in details while still being right in principle. Even 90 per cent. of the single track roads of the United States could enforce a passable block system within three months with no worse drawback than some delays to trains. With block sections long enough, the *expense* would be small. The cost of the delays would be the determining factor. That would be intolerable part of the time, but not for nearly so large a part as is generally estimated; and a trial would dissipate half the bugbears now so generally feared.

The staff system as generally operated in England is indeed cumbersome and often ridiculous, but if the Highland Railway of Scotland has a system of meeting orders that prevents butting collisions our American roads would do well to find out about it. Again, the cumbersomeness of the staff system is not an inevitable accompaniment of it. The Webb & Thompson electric apparatus, and the very practicable devices for taking and leaving staffs while a train is in motion remove the cumbersome features if there be not too much cumbersomeness in the manager's office.

We have ourselves criticised the Board on numerous occasions, and the foregoing is not intended as a wholesale justification of its doing; but government regulation is now one of the certainities of railroad life both in England and America, and it will be well to try and make the best of so conservative an authority as the English Board of Trade. Its recommendation, which the roads are not free to reject, are, as we understand the matter, very few. One of these which our correspondent has in mind is, we presume, the limitations of the hours of labor. Recommendations in this line are not now mandatory, but may soon be. But the only serious injustice in this is the liability that different companies may be affected unequally. This ought to be remediable.—EDITOR RAILROAD GAZETTE.]

Lights for Semaphore Signals.

BOSTON, July 20.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I thought if I kept silent long enough some one else would say the things which seemed to me important on the subject of night signals, with special reference to semaphore lights, but in only one or two points have my expectations been realized, and I am therefore compelled to take the pen in hand myself, and I beg in advance the pardon of those to whom it seems that the subject has already been discussed to dryness.

A night light for a semaphore signal may deceive the engineer of an approaching train in one of two ways, viz.: (1) By being mistaken for some other light in the same direction; (2) by showing a light of one color when it should, to indicate the true position of the signal, be of another color.

At the outset it would seem that there was small danger of there being another light so nearly in the same position with the signal light that the engineer of a train approaching the place would be unable to distinguish one from the other; but when this is the case, or there is reason to fear they may be confounded, a remedy can almost always be found by increasing the intensity of the signal light to a degree depending on the circumstances of the case. This may be done by using a more powerful lamp than is usually done, or in many cases quite as well, and at less expense, by a reflector, or by the use of a plain or corrugated lens. The difference between the signal light and that with which it might be confounded may thus be made as great as necessary, and there need never be the slightest hesitancy in distinguishing one from the other, or the signal light from a group of other lights among which it may be situated. There are cases where the best solution of the difficulty would be to provide a suitable background for the signal, so that all other lights in the same direction might be cut off, and the signal light alone appear.

It will be claimed by some that there will in certain cases be confusion between a signal light and an *electric arc* light in the same direction. This fear does not seem to me to be well grounded, for the difference in color is so great that there ought not to be the slightest hesitation in picking out the signal light, even where several electric lights could be seen, unless an electric light came exactly in line with that light. Moreover, an arc light so illuminates all surrounding objects, within quite a distance, that they can be distinguished much the same as by day, and the light on the signal becomes less important than in other locations, as the position of the arm can be plainly seen. It, however, renders less distinct the view of objects just beyond it, and for that reason it may be often necessary to hide it from the engineer's vision.

The case is however quite different when we consider the possibility of confounding the light of one signal with that of another near, or on the same post with it. The danger is greatly increased when there are a number of signals, that an approaching train may mistake another light for that of its own signal, and if the signals are not interlocked with the different routes, very serious consequences follow. Such a possibility, and even probability, as made manifest by an occasional accident, points out the danger of placing a large number of signals on the same post, or in other ways so near each other that it requires great care to determine at night which one is set clear or the reverse. It is safer, as well as more satisfactory, to put each signal on a post or frame of its own. But a small arm, illuminated by reflected light, may with safety be put above or below a speed route signal, and of course, when furnished with an indicator, may serve for any number of routes diverging from the main line in the vicinity, provided that the speed of trains governed by the small signal be so reduced that its indication can be plainly read at a distance sufficient for the train to be easily stopped, should the signal indicate the wrong route.

The second way in which a signal light may deceive an engineer is a far more serious one, as a considerable number of accidents testify, where the signal light should have shown danger, and in fact showed safety, by the substitution of the color indicating that signal for the one it should have exhibited. I think this danger can be eliminated by making the light for the all-clear signal of some distinctive color, for instance green, which is already so used in a variety of applications. This allows the provision that the appearance of a light of any other color, or the absence of a light of any kind, shall be taken as a danger signal. If this suggestion were adopted, the breaking of a glass in a signal could never (as it now sometimes does) give a false indication of safety when the signal really stands at danger. An instance of this recently happened on a Western road, where a freight train ran by a signal showing a white light, when it should have been red, and was thrown off the track at a derailing switch and down an embankment, narrowly escaping the destruction of a passenger train at a grade crossing to which the right of way had been given. This was due to a part of the red glass being broken out.

This brings me to the consideration of what I conceive to be the most important principle applicable to this subject, viz.: Trains should never be run past a junction or other place of extraordinary danger, by *danger* signals, but always by *safety* signals; that is, things should not be presumed to be all right unless a *danger* signal is displayed, but should be understood to be all wrong, unless the signal indicating *safety* is clearly and unmistakably given. The safety signal then should be of some distinctive form or color, which cannot be confounded with anything else. I said form *or* color; to include all the essential points of an ideal signal, it should read form *and* color, neither of which can be mistaken for some other signal. This can be provided for in several ways: by a blade illuminated; by the use of Koyl's parabolic semaphore; or by two or more lights arranged in different ways, for instance, in a horizontal and a vertical series, as is done on the Old Colony and Boston & Albany and some other railroads. Those who have never seen these signals by night can have but little conception of the striking and unmistakable difference in the danger and safety signals, whether the former be composed of red, white or green lights. All these have been in use, and all are serviceable, but, for the reasons above given, the white light is, in my judgment, preferable. It is worth noticing, that the extinction of a single light or even two lights in this system will not cause the slightest ambiguity in the signal, but only render it less easily interpreted when in one or the other of its positions, as both the color and the arrangement of the lights is changed with every change of the signal.

The principle here adopted is the same as that before spoken of, viz., the safety signal has a distinct color, and the breaking of a glass or the extinction of a light can never accidentally produce it. Whatever errors it may make are on the side of safety. Therefore, whatever be the number or arrangement of the lights for a safety signal, they should never be white. Green would seem to be the best color for this purpose, because it can be seen farther than almost any other colored light except red, is not liable to be confounded with anything else, and, still more important, is already in extensive use for this purpose. Another advantage its adoption would have is that it may be also used (as is now the case with some exceptions) for *automatic* signals, without departure from the principle, the two systems being distinct in form, purpose and manner of operation. It may appear that this last is not an important argument, as at present but few roads would be affected, but each year the number will increase of those who find out what a unique and exceedingly valuable addition to all other known precautions for the safety of trains they may be made, and to each important road which ascertains this fact they will be indispensable. The light on an automatic signal at danger may be red or white; preferably, I think, red; the safety light should be green. But as when one is not safe, he is always in danger, no matter what the kind, arrangement or purpose of the signals, or how they may be operated, the absence of the light or lights indicating safety should mean a danger signal, and whether or not

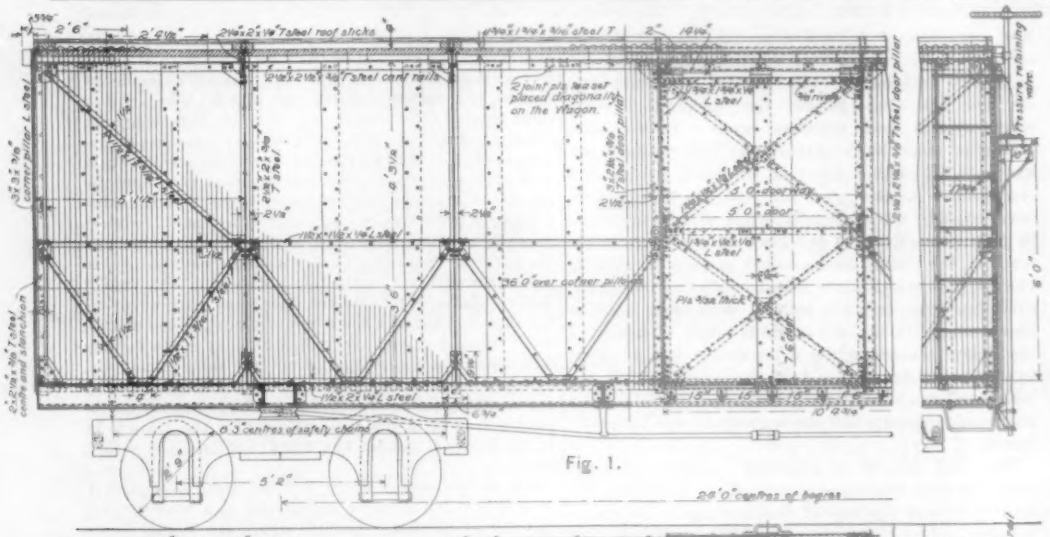


Fig. 1.

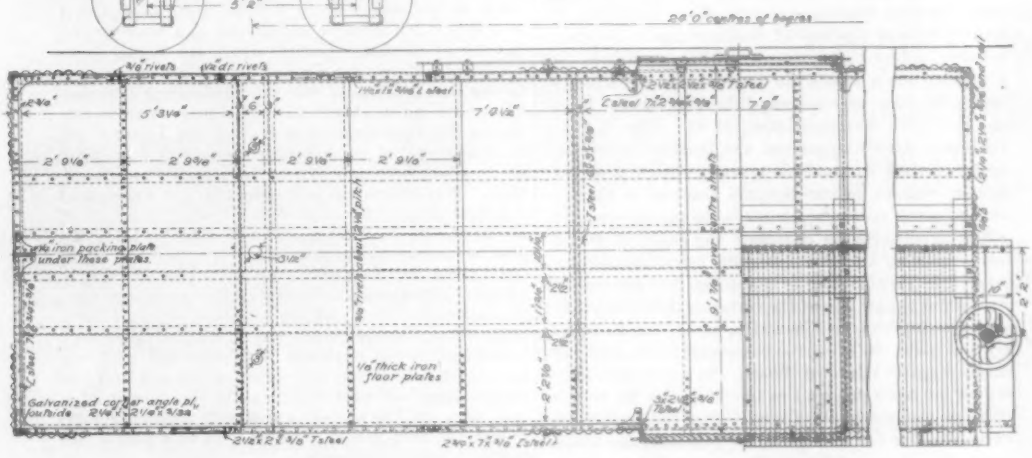


Fig. 2.

Body Plan and Elevation of Iron and Steel Box Car—Mexican Railway.

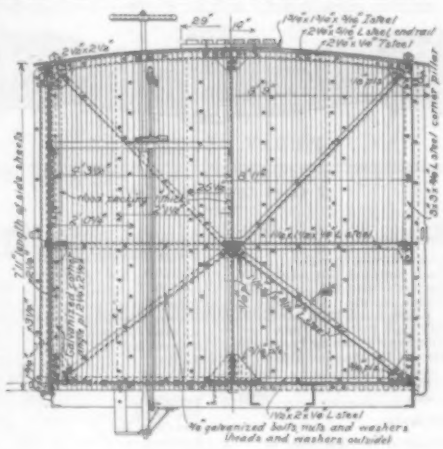


Fig. 3.

sills, the intermediate and centre sills being cut at their intersection with these cross-ties. The flooring is of ¼-in. iron plates, riveted to sills, transoms and cross-ties.

The body framing is composed entirely of steel angles and tees. See figs. 1, 2 and 3. The general dimensions of the parts are as follows:

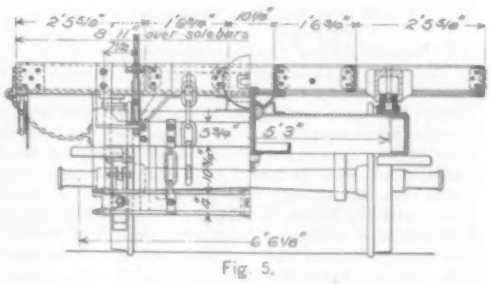


Fig. 5.

Corner posts	3 × 3 × ⅜-in. angles.
End and side posts	2 × 2½ × ⅜-in. tees.
Door posts	3 × 2½ × ⅜-in. "
	2½ × 2½ × ⅜-in. "
Side plates	2½ × 2½ × ⅜-in. angles.
End plates	2½ × 2½ × ⅜-in. "
Belt rail of girth	1½ × 1½ × ¼-in. "
Diagonal bracing	1½ × 1 × ⅛ "
Ridge pole	1½ × 1½ × ⅛ tees.
Carlins	2½ × 2 × ¼ "
Door frame	1¾ × 1¾ × ¼ angles.
Door frame diagonal bracing	1¾ × ⅛ × ⅛

The framing is attached to sills by means of 1½ × 1 × 3-16 inch angles, riveted to the sills through the floor plates. The ends of these angles are bent up at each post intersection and riveted to them. The diagonal bracing below the belt rail and between the posts are of one continuous piece riveted to the lower angles and

they are replaced by those of another color designated for danger signals, the train should be stopped, and proceed only as the way is known to be clear.

I have as yet said nothing about cautionary signals as given by a third position of the semaphore arm by day, as it seems to me all that is of value in this manner of using signals can be got in other ways, but where they must be provided for, it may be done for night service by two lights arranged diagonally, thus indicating in a general way the night signal in the same form as the day signal is given. This would not necessarily require any additional lights if more than one were used for the other signals.

GEORGE W. BLODGETT.

Iron and Steel Box Car—Mexican Railway.

The freight cars of the type shown in the engravings were built at Manchester, England, by the Ashbury Railway Carriage & Iron Co., Limited, for the Mexican Railway. These cars are 36 ft. long by 9 ft. 1⅛ in. wide inside, and 7 ft. 9½ in. high in the clear. They are built entirely of iron and steel. The outside and end sills are 7 × 2¾ × ⅜ inch steel channels, as shown by figs. 4 and 6. The intermediate and centre sills are of 6 × 2¾ × ⅜ inch steel channels. The transoms and cross-ties are made of 6 × 3 × ⅜ inch steel I-beams. The transoms are made in sections and placed between the sills, similar to spacing blocks. The cross-ties are continuous between the side

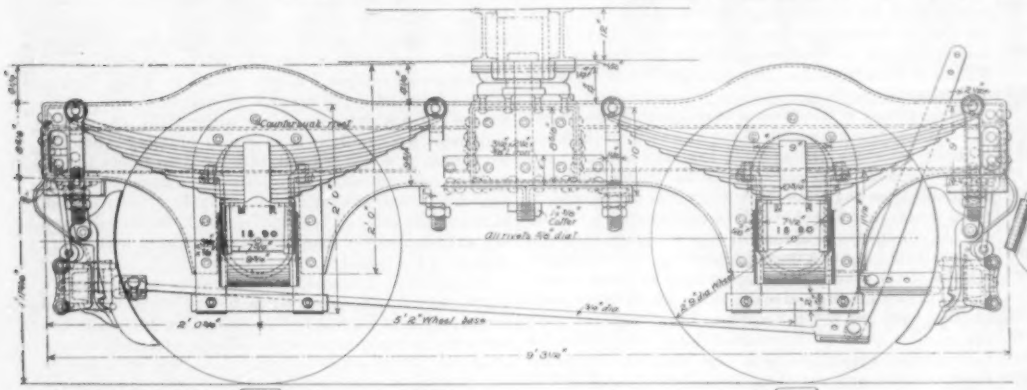


Fig. 7.

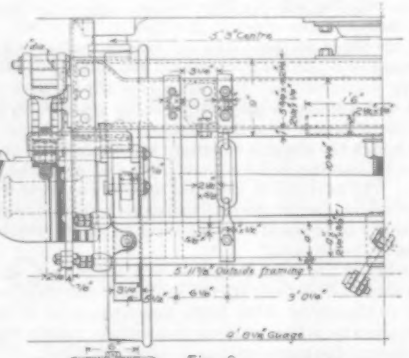


Fig. 9.

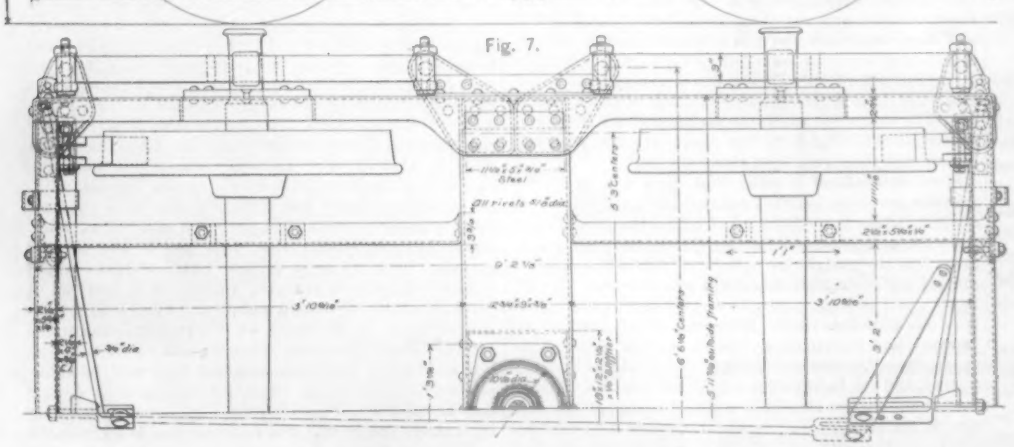


Fig. 8.

Fox Pressed Steel Truck for Iron and Steel Box Car—Mexican Railway.

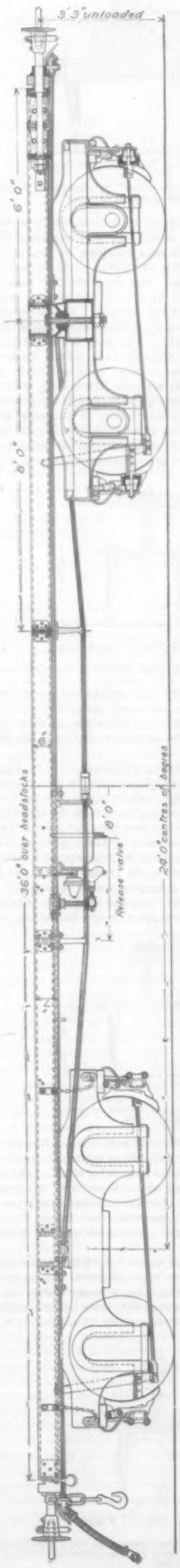


Fig. 4.

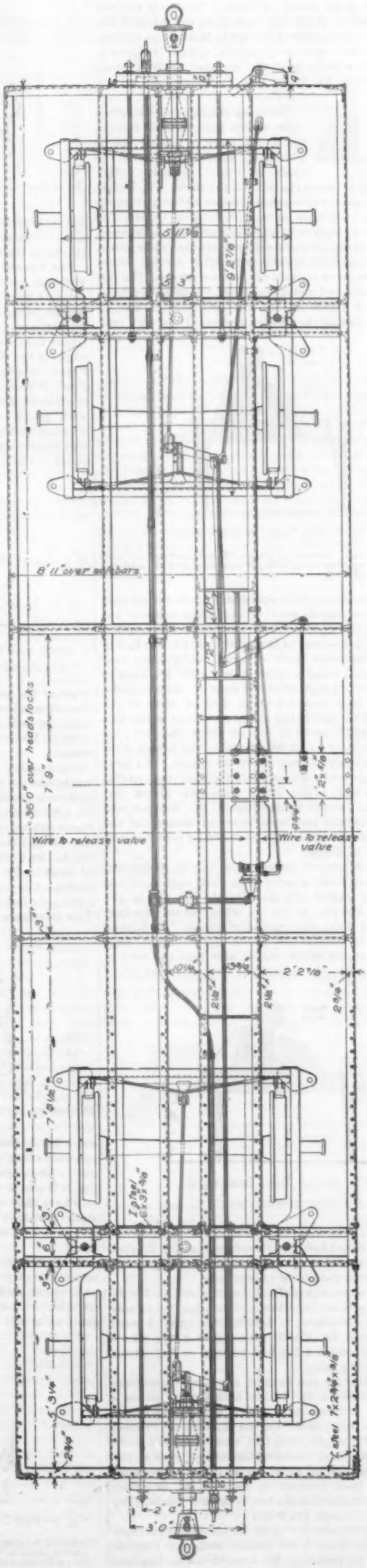


Fig. 6.

Underframing, Trucks and Brake Rigging—Iron and Steel Box Car—Mexican Railway.

floor plates, and to the plates at the junction of post and belt rail. All joints and angles in the framing are made with the usual knees and joint plates used in metal construction of this nature. The siding and roof covering is of galvanized corrugated sheet iron of the following specified weight: "The sheets to weigh 1¾ lbs. (28 oz.) per foot (when flat and before galvanizing), and 30 oz. per foot when galvanized." The corrugations are ⅝ in. deep with 3 in. pitch. The iron door plates are flat and 3-32 in. thick. The corrugated sheets for siding are 2 ft. 4½ in. wide by 7 ft. 11 in. long. They are lapped 4½ in. at joints and riveted together. The siding plates are bolted to the framing with galvanized iron bolts, nuts and washers. The roof sheets are lapped 4½ in. and riveted and bolted to the roof timbers and side plates. The running board, 2 ft. 5 in. wide, is made up of six pieces of 3½-in. by 1⅛-in. wood, spaced 1 in. apart, and rests upon spacing blocks placed above every other carlin. The whole is then bolted through the roof to the carlins with ⅝-in. countersunk bolts. This binds the centre of the metal roof to the car, while the outer ends are held in place by wooden binding strips bolted through the roof to the side plate. The truss rods do not run the entire length of the car, as in modern American practice with wooden cars, but are attached to the side sills at the transoms, and have the usual right and left turnbuckles in the centre. The overhang is not trussed, the frame being sufficiently strong.

The trucks, figs. 7, 8, 9 and 10, are made with rigid bolsters. The truck frames are of Fox solid pressed steel throughout, including the centre bearing plates. They were made at Leeds Forge, England. The side plates are reinforced at the journal box opening by riveting on a crown of ⅝ × 3½-in. iron, which acts as pedestal braces for the journal boxes. The springs are semi-elliptic and hung outside of truck frame. The method of attaching them to the truck is shown in figs. 7, 8, 9 and 10. The king bolt or centre pin is threaded at lower end for a nut, and also has a key to prevent the nut backing off, The trucks have outside hung brakes. The brake beams are of channel steel, 2⅜ × 5¾ × ¼ in., braced by two ⅝-in. rods.

A novel feature is the side bearings (see fig. 10). A spring is inserted in a cast iron pocket attached to transom and held together by a bolt and bearing block. The action is readily seen by reference to the engravings. The wheel base is 5 ft. 2 in. Distance between truck centres, 24 ft. All cars are equipped with Westinghouse automatic brakes, safety chains and link and pin drawbars. The draft springs are of the double conical English type.

The Cairo Bridge.

The bridge of the Illinois Central Railroad over the Ohio River at Cairo was begun July 1, 1887, and opened for traffic Oct. 29, 1889. We have already given a somewhat complete description of the surveys for this bridge and of the foundations and masonry in our issue of June 1, 1888. That description was written by Mr. S. F. Balcom, Assistant Engineer of the Illinois Central. In our issue of June 11, 1889, appeared an account of the very rapid work done by the Baird Brothers in erecting two of the spans of this bridge, with some interesting illustrations from photographs. This, we believe, was the fastest erecting ever done in the world, at least nobody, so far as we know, has ever disputed this claim. From time to time we chronicled the progress of the work up to its completion.

We now receive the report of the Chief Engineer, Mr. George S. Morison, to the President of the company, and the report of the President to the Directors. These documents give a sufficient history of the project and a pretty good technical description. The report is issued in the form in which Mr. Morison is accustomed to have his great reports appear; that is, in a large pamphlet 13⅛ × 29 in., giving room on the pages for very satisfactory lithographs of general and detail drawings. Mr. Morison was Chief Engineer, Mr. E. L. Corthell Associate Chief Engineer, Mr. Alfred Noble Resident Engineer up to Nov. 30, 1889, and Mr. George A. Lederle Resident Engineer from Dec. 1, 1889, to Feb. 28, 1890. The Union Bridge Co. had the contract for substructure and superstructure.

The bridge crosses the Ohio River about 3⅛ miles above its junction with the Mississippi, and is said to be the longest metal structure across any river in the world, being 33 ft. longer than the Tay bridge. The metal work is 10,560 ft. long, and the total structure, including timber trestle approaches, is 20,461 ft. On each approach there is a 5-deg. curve. On the main structure the grade is level, but on both approaches there are grades ascending toward the main structure of 40 ft. to the mile on the straight line and 30 ft. on the curves.

Borings to an extreme depth of 190 ft. below low water showed nothing but alluvial deposit, varying from fine sand to gravel. The foundations, therefore, must be sustained in the sand, and the caissons were sunk to various depths up to an extreme of 125 ft. below high water. The largest of the caissons are 30 × 70 ft. × 16 ft. high. They are built of pine timber with oak sills and iron cutting edges, and filled with concrete. No difficulty in sinking them is mentioned, except that the caisson of pier two sank out of level and some difficulty was found in righting it by blocking under the cutting edge. It was finally got fairly into position.

The entire superstructure except the pedestals is of

steel and the floor system is designed for a uniform load of 6,000 lbs. per lineal foot. The compressive strain in the top chord is limited to 14,000 lbs. per square inch of balanced section and the tensile strain in the bottom chord is 13,000 lbs.

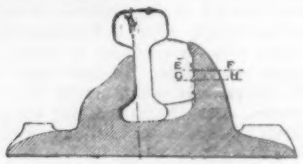
The superstructure consists of two through spans each 518.5 ft. long and seven each 400 ft. long and three deck spans each 249 ft. long. These rest on masonry piers, all but three of which have pneumatic foundations. The viaduct on the Kentucky side has 21 spans of 150 ft. each and one of 106.25 ft. on iron cylinder piers filled with concrete. The Illinois viaduct consists of 17 spans of 150 ft. each and one of 106.25 ft. and it is precisely like the Kentucky approach in construction. The timber trestles are in all 9,001 ft. long. The two principal through trusses are spaced 25 ft. centres and are 61 ft. deep. The other seven through spans have the trusses spaced 22 ft. and are 50 ft. deep. The deck spans are spaced 18 ft. between centres.

The cost of the bridge was: Substructure, $1,189,744; superstructure, $765,616; approaches, $628,458. The total, including protection works, right of way, engineering and other miscellaneous items, was $2,675,458.

There are 11 appendices which give the law, charter and contract with the War Department under which the bridge was built; two preliminary reports from the engineers, the contracts with the Union Bridge Co. and the specifications. They also give in great detail the record of sinking the caissons and tests of steel eye bars. There are 37 lithographed plates giving general and detail views of the whole structure, strain sheets and other information.

A Comparative Study of Chair Rails and Flange Rails.

In the middle of last May Mr. Freund, Engineer of Maintenance of Way of the Eastern Railroad of France, published a pretty detailed paper giving the results of his investigations into the comparative performance of track laid with double-headed (or bull-headed) and flange rails. We shall give here a somewhat short abstract of this paper, which appears in full in *Les Annales des Travaux Publics*.



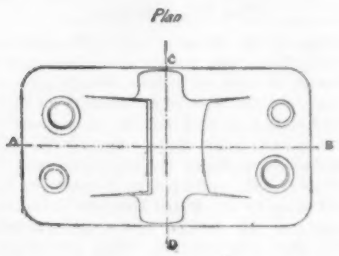


Fig. 1.

Mr. Freund examined several English railroads, more particularly the London & Northwestern, and his conclusions as to the advantages and disadvantages of double-headed rails are drawn largely from his observations on that road.

In the *Railroad Gazette* of July 8, 1887, was published a somewhat full description of the London & Northwestern permanent way. We shall give here, therefore, only so much as is necessary to make clear what Mr. Freund has to say.

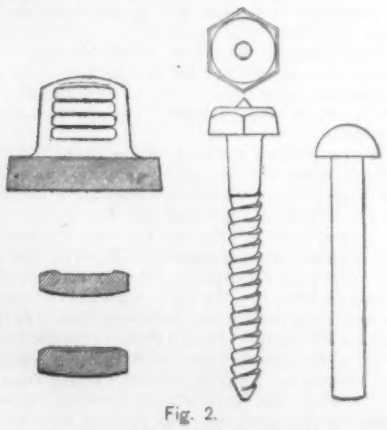


Fig. 2.

The old standard of the London & Northwestern, of which there is considerable yet in service, used a double-headed rail 84 lbs. to the yard, and the new standard is a bull-head rail of 90 lbs. to the yard. The joints are placed opposite to each other and are suspended, and in the new system the angle plates embrace the lower head. The ties are Baltic pine injected with 3¾ gals. of creosote oil. There are 10 ties to a 30-ft. rail. [The details of the metal tie track are given in the *Railroad Gazette* article referred to above.—EDITOR.] The rails are laid in chairs (fig. 1); these are cast iron, weighing 44 lbs. each. In the old standard track the fastenings are two wooden pins and two iron cylindrical spikes. In the new standard the wooden pins are replaced by iron screw spikes. (See fig. 2.) These iron fastenings are galvanized.

Fig. 3.

The taper shank of the screwed spike draws into an oak ferrule, fig. 3. A piece of tarred felt is placed between the rail and the chair in recent practice. Oak keys are used between the rail and the chair. The ballast is ordinarily gravel or furnace cinders, although important renewals have been made with broken stone. The track rides very smoothly, showing careful maintenance, although with the old standard there are many low joints.

Examination of the various parts after service shows that the surfaces in contact are seriously worn. The ties are deeply indented under the chairs, which have a bearing surface of about 124 sq. in. This wear of the tie reaches one inch on the steeper grades. It is very irregular and leaves the rail suspended over a tie or two, which leads to rapid wear of the spike holes in the chairs and of the wooden ferrules around the iron spikes and of the displacement of the latter. The lower face of the ties is often found badly checked, particularly near the fastenings. Wooden shims ¼ in. thick are used to adjust the rail to gauge after the wear of various parts.

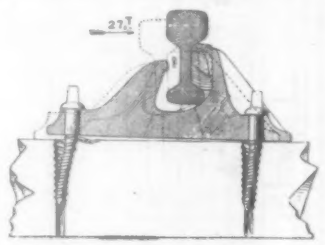


Fig 4—Oak Ties; Wooden Keys.

Stopped at 27 tons. Spread of gauge, 130 millimetres; tie bent, 10 millimetres; chair displaced, 20 mm. horizontally and key compressed, 18 mm.

It is found that there is a good deal of wear of the lower head of the rail in the chairs as well as of the web where it comes in comes in contact with the jaw; for example, rails over which 300,000 trains had passed were found to be worn 2 millimetres by the chairs. The wear of the running surface was scarcely 3 millimetres. As this wear and the wear at the joints were only about one-third of what would be justifiable, Mr. Freund concludes that the rails had been renewed because of the wear which permitted them to be displaced sidewise, and of the change in gauge.

The allowable play in the gauge he fixes at 15 millimetres, and a very small wear of each part, that is, of the rail and of the jaw of the chair, of the rail seat in the chair, and of the top of the tie, when added together would allow a dangerous spread of gauge. It follows that the use of these chairs limits the service of English rails to about 300,000 trains, and that the wear in the chairs becomes the controlling element of the life of the rails. It is even more serious than the wear of the joints. Mr. Freund believes, therefore, that the English type is not an economical one for steel rails, but that it is a survival from the period of iron rails.

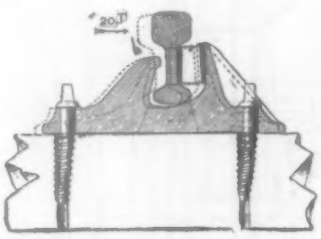


Fig. 5—Oak Ties; Steel Keys.

At 23 tons a key broke; at 20 tons gauge spread 55 mm.

The wear of steel rails is about 1 millimetre for 100,000 trains under ordinary conditions. Of course this is only a very general statement; in fact he has found a wear of 15 millimetres for 100,000 trains in a place where pretty nearly 70 trains a day had to stop on a grade of about 30 ft. to the mile.

The wear under the rail head at the joint varies from 0.4 to 0.6 millimetre for 100,000 trains with either a double-headed or flange rail. This is with heavy flange rails and supported joints. On the Eastern of France, with a rail of 66 lbs. per yard, this wear reaches 1 millimetre, and parts were renewed because of wear at the joints after a service of about 250,000 trains. The wear has, however, been reduced in the last six or seven years by the introduction of a better form of joints. [See *Railroad Gazette*, page 240, 1892.]

As remarked before, the wear at the joints becomes secondary to the wear in the chairs with the English type of track, nevertheless Mr. Freund saw in England

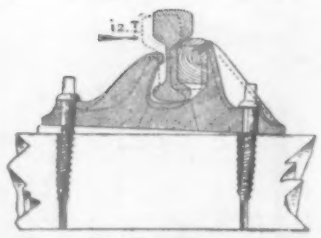


Fig. 6—Pine Tie; Wooden Key.

At 12 tons "complete dislocation" of chair and fastenings; spread of gauge, 48 mm.

low joints from wear of the angle bars, which were very close to the allowable limit. He was surprised to find this to be the case with rails weighing 93 lbs. per yard.

The wear of the rails in the chairs is at two points, the web and the lower head, and in these two places the relative wear is about as 2 to 3; the greater wear, of course, being on the lower surface. The wear of the web appears to be about 0.7 millimetre for 100,000 trains, where the track is sandy. The wear of the bottom and edges of the flange of Vignole rails on the Eastern of France may be sufficient to cause rails to break on account of weakening the section. This wear, of course, is greatest in sandy places. Where rails have been laid with pieces of felt under them, it becomes almost nothing, and the opinion is expressed that rails so laid will endure a service of at least 1,000,000 trains; that is about to the limit of wear on the running surface, if the wear of the joints can be kept within the proper limits. The wear where plates are used under the joints has been the principal cause of renewals of rails on the Eastern Railroad of France after a service of but 600,000 trains.

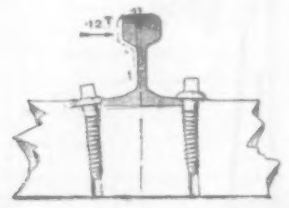


Fig. 7—Oak Ties; Two Screws.

Dislocation began at 12 tons; spread of gauge, 21 mm.

The number of trackmen employed on the English roads was found to be about one man to the kilometre of double track, and is equivalent to about 10 days' work for 1,000 trains. This is rather more than the standard of the Northwestern, which is four men for two miles on four-track road—and four men for three miles on double track. In France the number of trackmen on railroads of large traffic runs from 10 to 18 days' work per 1,000 trains. The difference is largely one of ballast. To replace a tie in France takes twice as long as in England. This is because in France the ties are buried so much more deeply under the ballast; nevertheless Mr. Freund concludes that the labor expense of maintenance of way on the Eastern of France is no greater than on the London & Northwestern, and on such parts of his line as still have the chair type of track, he found that with the same standard of maintenance the labor element amounts to about 25 per cent. more on the Vignole track.

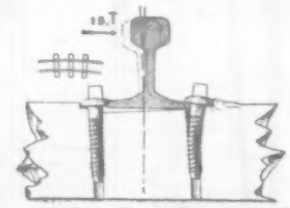


Fig. 8—Oak Ties; Three Screws; on Curve.

Dislocation began at 15 tons; spread of gauge, 19 mm.; tie bent, 7 mm.

Mr. Freund discusses at some length the question of lateral stability of the two types of track. He concludes from theory and experiment that a flange rail on an oak tie, with screwed spikes, is as safe from lateral displacement as a bull head rail in a chair or a flange rail on

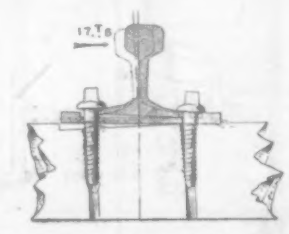


Fig. 9—Pine Ties; Four Screws; Plates, 7 in. × 10 in.

Dislocation began at 17.5 tons; spread, 20 mm.; inside spikes partly drawn; rail inclined, leaving greatest opening between flange and plate, 5 mm.

COMPOUND LOCOMOTIVE TESTS ON THE CHICAGO, MILWAUKEE & ST. PAUL.

TABLE A.

General averages, leaving out trips on lines 1, 5, 9, 10, 11 and 23 of original report. This table will accompany table 3 of original report. See Railroad Gazette, June 24, 1892.

Column No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	Cars.				Time.			Speed.		Train results.		Dynamometer results.					
Braceville Coal. West bound.	Loaded.	Empty.	Weight of train exclusive of engine.	Train ton miles, including engine.	On road.	Running.	Working steam.	For trip.	Excluding stops.	Coal per ton mile.	Water per ton mile and at 212°.	Total foot tons.	Foot tons per lb. coal.	Foot tons per lb. of water at 212°.	Coal per H. P. per hour.	Water per H.P. per hour from and at 212°.	Number of trips.
Eng. 822 at 180 lbs.	22	4	474	82,506	6.71	3.65	3.50	15.82	24.40	.143	.97	1,530,226	201.9	30.09	4.97	34.34	6
Eng. 827 at 180 lbs	18	5	540	54,035	4.33	3.36	3.12	18.25	27.32	.142	.86	1,639,880	256.	36.62	4.20	27.04	2
Eng. 827 at 200 lbs.	23	6	545	58,885	5.59	3.91	3.29	16.4	23.6	.113	.76	1,737,232	274.3	30.40	3.76	25.32	5
East bound.																	
Eng. 822 at 180 lbs.	26	3	748	77,602	5.94	4.22	3 19	16.8	23.3	.104	.68	1,699,999	269.4	32.38	4.74	30.80	8
Eng. 827 at 180 lbs.	25	4	743	77,167	6.10	3.97	3.18	15.6	23.2	.096	.61	1,671,990	252.9	35.53	3.92	27.91	5
Eng. 827 at 200 lbs	26	8	798	82,156	5.49	3.90	2 90	16.8	25.1	.088	.59	1,830,063	253.7	37.79	3.91	26.25	6

a tie plate on pine or fir ties; and either type, with proper fastenings and attention, is safe enough, and in comparison of the two types, he leaves out this element. Otherwise his conclusion is that the flange rail will come nearer to giving the legitimate service than the double-headed rail, because the life of the rail is limited by the wear of the surfaces in contact in the chairs, and not by the running surface.

We add a few sketches showing the results of experiments to determine the resistance to lateral thrust with arious types of track.

Tests of Locomotives on the Chicago, Milwaukee & St. Paul Railway.

Mr. George Gibbs, Mechanical Engineer of the Chicago, Milwaukee & St. Paul Railway and Chairman of the Committee on Compound Locomotives appointed by the Master Mechanics' Association has made a further analysis of the report which that committee presented at the Saratoga Convention. This latest analysis is based upon the exclusion of some of the abnormal trips. That is, those trips that are noncomparable and are unusual are omitted, and the averages are made from the trips that were made under about the same general conditions. Table *A* gives the general average of the trips made, leaving out the trips given on the lines 1, 5, 9, 10, 11 and 23 of the table in the original report, and is intended to accompany table 3 of the original report. See *Railroad Gazette*, June 24, 1892.

Table *B* shows the percentage of saving of the compound engine deduced from table *A*. There can be no doubt but that this last analysis of the results obtained on the long series of tests made by Mr. Gibbs is more accurate than the preliminary conclusions reached at the time of the convention. In fact, at that time Mr. Gibbs said that when the report was published in the proceedings the conclusions would probably be changed as the committee had not had time to review the matter as thoroughly as they desired and therefore reserved the right to make changes in the conclusions.

This new analysis gives a saving of $13\frac{1}{10}$ per cent. in coal per ton mile, including the weights of the engine and tender, as well as the weights of the cars. The saving of water per ton mile is $14\frac{1}{10}$ per cent., or slightly greater than the saving in coal. There is nothing on the face of the tables here given that would show the reason for the coincidence between the water and the coal saving, but examination of the details of the original report show that the average evaporation of the compound did not differ much from the average evaporation of the simple engine, and therefore the saving in the coal and water would be practically the same. The savings in dynamometer work per pound coal and per pound water, as given by these tables, are about the same; that is, there is not the usual difference that has so often been shown to exist between the amount of water saved and the amount of coal saved by compounding.

The reason for the different percentages of saving, given in the table *B*, when the dynamometer work is used as a basis instead of the ton mile, arises from the fact that the dynamometer work is not directly proportional to the ton miles, as is shown in the editorial columns of this issue, where appears an analysis of the original report. In making up the table of general averages in table *A*, Mr. Gibbs has considered it important to take into account the maximum and minimum amounts as well as the average of the different results. The argument about this is, that it is only safe to rely upon an average of several results when the variation between the results is comparatively small. A case of this kind appears in column two, table *A*, where the average number of empty cars for the different trips is given as four; the maximum number was 16 and the minimum two. This difference would affect the ton mile basis considerably, but practically disappears when the results are analyzed on the dynamometer work basis.

The original report contained a vast amount of information and the meaning of it is not easily deduced. If all of the trips made, about 60, had been under as nearly as possible the same conditions it would have been easier to deduce conclusions, but as trains were made up and run in accordance with the service condition of the road the natural result was a large amount of noncomparable data, and one must look pretty closely after the conditions existing before drawing conclusions from the tests. The accuracy with which the work was performed and compiled and the completeness of the measurements made are all that has saved the data from being a series of tests useful only as records trips.

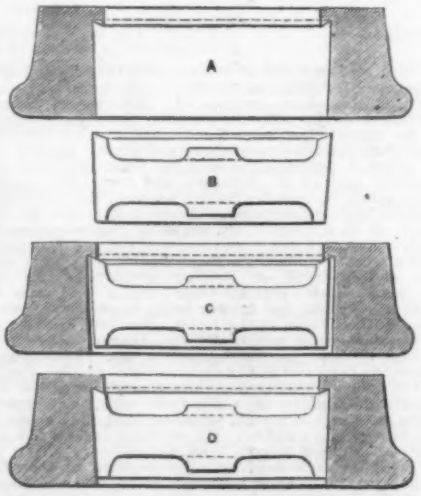
TABLE B.

Percentages of saving by use of compound, deduced from table A of general averages.

Conditions.		Line No.	Train results. Coal per ton mile.	Train results. Water per ton mile.	Dynamometer results. Foot tons per pound coal.	Dynamometer results. Foot tons per pound water.	Dynamometer results. Coal per horse power per hour.	Dynamometer results. Water per horse power per hour.
Braceville coal. West.	Column No.	1	2	3	4	5	6	7
	180 lbs. (822 / 827)	1	0	11.3	11.4	21.6	15.4	21.2
	Eng. 822 at 180 lbs.	2	21	21.6	35.8	30.9	28.3	36.2
	Eng. 827 at 200 "							
	Eng. 827 (180 lbs. / 200 ")	3	20.4	11.6	16.7	7.2	10.4	6.3
	All trips							
Braceville coal. East.	180 lbs. (822 / 827)	4	10.5	16.4	23.6	26.2	20.8	23.7
		5	17.3	10.3	20.8	10.1	17.3	9.1
	Eng. 822 at 180 lbs.	6	15.4	13.2	21.2	17.1	17.5	14.8
	Eng. 827 at 200 "							
	Eng. 827 (180 lbs. / 200 ")	7	2.3	4.9	3.2	6.3	0	6.0
	All trips	8	16.3	11.8	21.0	13.6	17.4	12.1
Total East and West		9	13.4	14.1	22.3	19.9	19.1	17.9

Legoux's Fastening.

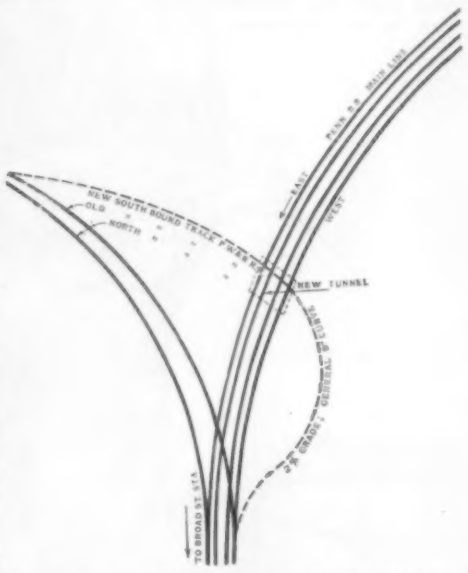
Mons. H. Bollinckx, a well known Brussels engineer, is now introducing the method of securing railroad wheel tires which is illustrated by the accompanying engravings. *A* shows the tire, bored out slightly conical, and



ready to be dropped on to the wheel body. *B* shows the wheel body, turned up and ready to receive the tire. *C* shows the tire heated and placed on the wheel body. The enlargement is shown exaggerated for the sake of clearness. *D* shows the wheel finished, with the tire in place. It is stated that even when the tire is broken it is retained in place by the turned in lip on the front side. The inventor and patentee is Mons. Legoux, a Belgian engineer of experience in railroad work.—*The Engineer.*

New Undergrade Crossing of the Pennsylvania Main Line and P., W. & B.

The accompanying sketch shows the method which has been adopted to eliminate a grade crossing on the main line of the Pennsylvania at Thirtieth street, Philadelphia. The old south bound track of the Philadelphia, Wilmington & Baltimore crosses the four main tracks of the Pennsylvania at this grade, making a dangerous and very objectionable crossing. The new south bound track is shown by the dotted line and also the new tunnel.



Pennsylvania Undergrade Crossing at Philadelphia.

The new line will be built on a two per cent. grade and a general nine degree curve. The height of the tunnel from base of rail to the roof is 18 ft. 1 in., and the width is 31 ft. The contractor for the work is P. McManus, of 1404 South Penn Square, Philadelphia, and he is bound by contract to finish the work in 90 days. The immense advantage of this improvement will be readily seen, as all four tracks of the Pennsylvania were blocked whenever a south bound train of the Philadelphia, Wilmington & Baltimore crossed. The present north bound track of the P., W. & B. R. R. will be left as it is.

Hours of Work on French Railroads.

In April, 1891, the French Department of Public Works, issued a sheet of regulations for the hours of labor of locomotive runners and firemen, according to which the number of hours of daily work was not to exceed 12 out of the 24, and there was to be an uninterrupted period of rest of not less than 10 hours. Owing to possible misinterpretations of these regulations, they have just been issued in a revised and more explicit form and are to go into effect at once.

They specify that the actual working time of the employés must be so interposed between two periods of rest of at least 10 consecutive hours each that in no period of 24 hours there shall be more than 12 hours of duty nor less than 10 hours of broken rest. The period of work comprises the whole time during which the presence of the men is necessary, whether they be on their engines or in the roundhouses or shops, and the period of rest is to comprise only that time during which their presence is not required in any way. The 12 hours out of 25 are to represent a maximum period and should not be required in all, except a few, cases, particularly not in passenger train service. Departures from this rule should be made only in most ex-

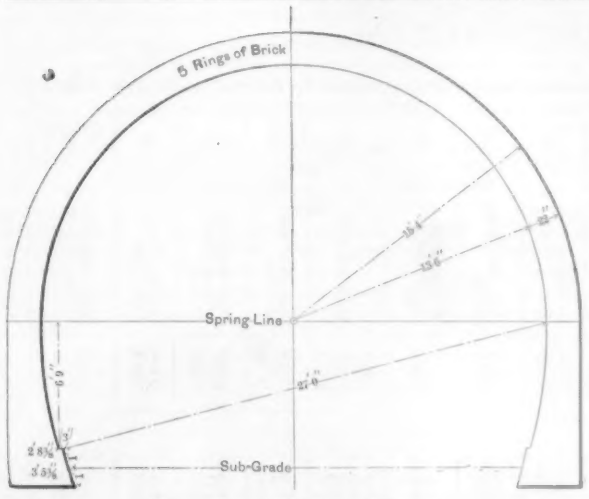


Fig. 1—Typical Section of Tunnel.

ceptional cases, and then only with the sanction of the public works department. If the length of the working time be exceeded in any case, the railroad company must duly report the fact, such reports to be submitted to the department on the 10th of every month. These reports, however, do not exempt those responsible for the overtime work from prosecution by the department. Changes in time-tables likely to affect the working time of engineers and firemen must be submitted to the department for examination. Finally, it is recommended that the railroad companies so arrange their schedules that the employés can return to their homes as often as possible during their intermissions of rest.

The Baltimore Belt Line Tunnel.

The main object of the belt line is to afford the Baltimore & Ohio Railroad, a shorter and all-rail route to the North and to give this company and the Maryland Central Railway Co. facilities for reaching the heart of the city of Baltimore equal to those enjoyed by the Pennsylvania Railroad Co. At present the trains over the Philadelphia division of the Baltimore & Ohio enter and leave Baltimore by a ferry transfer three-quarters of a mile in length. The work is being done by Messrs. Ryan & McDonald.

The Belt railroad commences on South Howard street, near Hamburg street, in the neighborhood of the yard of the Baltimore & Ohio, and runs out Howard street beyond Richmond Market, then through open cuttings to the terminal of the Maryland Central Railroad, then along the south side of Seventh street to the city limits and Bayview station, where it will connect with the tracks of the Philadelphia division of the Baltimore & Ohio.

To provide capital for the work, the Maryland Construction Co. was organized, and John P. McDonald, one of the present contractors, was elected President. Work was commenced in September, 1890. The entire length of line is 7.2 miles, of which 8,000 ft. is underground. The estimated cost of the entire line is about $6,000,000, and of the tunnel $1,750,000.

The section is shown in fig. 1, and is 27 ft. wide and 22 ft. high, maximum dimensions. The greater part of the soil through which the tunnel is being driven is sand, but there are seams of gravel, clay, etc., with layers of rock, and one section where for about 550 ft. the tunnel will be driven through solid rock. The greatest distance between the crown of the tunnel and the surface is 70 ft., and as the work extends the greater part of its length under Howard street, one of the principal business streets of the city, excavation had to be carried on without obstructing the street, adding largely to the difficulty of the work.

Five shafts have been sunk from the surface, all on one side of the line of the tunnel, and these are connected to the tunnel at the bottom by horizontal drifts. Fig. 2 shows the details at shaft No. 3, the horizontal dimensions of which are 9 × 14 ft., inside timbers, and total height of hoist, 54 ft. The shaft is divided into two compartments, the elevator well and a well in which to lower long timbers. The former contains a cage carrying rails for the dump car, and is operated by a Ryan & McDonald hoisting engine situated at the mouth of the shaft. Here is also placed a second engine for operating a timber derrick, as well as an electric light engine and dynamo, and the boilers for furnishing steam. The material removed from the heading is dragged by mule power in dump cars to the shaft and raised to the surface, when it is dumped into carts and afterward used for filling on the Baltimore & Ohio.

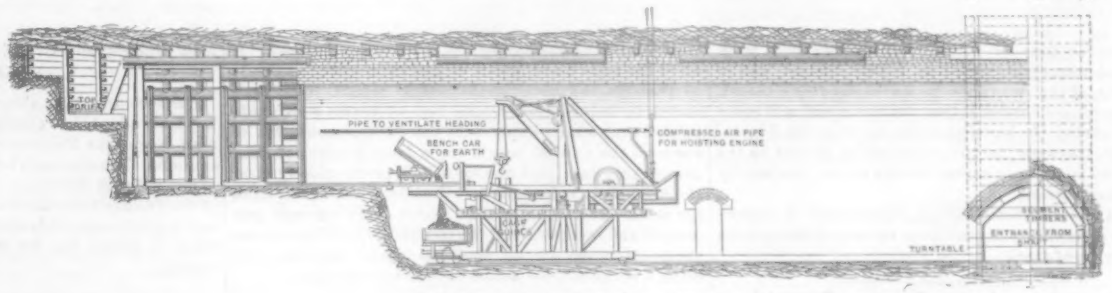
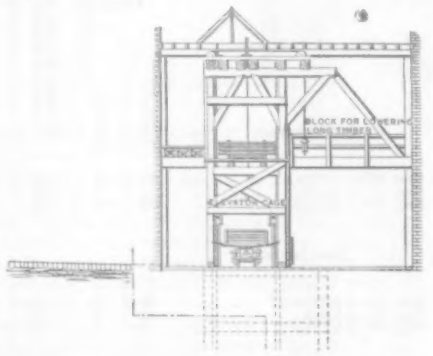


Fig. 2—Longitudinal Section at Shaft No. 3.

Fig. 2 also shows section of a heading with bench derrick at work. There is a similar derrick and rigging in the opposite heading. The arrangements at the other four shafts are like those described above, except that at shaft 5 buckets are used to hoist the excavated material instead of elevators, and there is no electric light plant, current for the arc lamps in the drifts being derived from the stations at shafts Nos. 2 and 3. Otis Bros., of New York City, supplied the elevators for shafts Nos. 1, 2 and 3, and Bates & Co., of Baltimore, that at shaft No. 5. Figs. 3 and 4 show sections of heading and method of driving employed. As will be seen, two bottom side drifts and one top drift are driven, the former being kept about twenty-five feet in advance of the latter. By this method the material through which the top drift is being driven is kept drained by the bottom drifts. Considerable water has been met in the construction of the tunnel, and in many of the bottom drifts enough water is constantly flowing to fill a five-inch pipe. The bottom drifts are about 8 × 8 ft., affording sufficient room for two miners and a helper. By working in two ten-hour shifts an advance of from 50 to 90 feet per month can be made in each heading. The bottom of each drift is then excavated until a solid foundation is obtained, concrete, if necessary, being laid for a depth of one or two feet; the side walls are then built, and the space between the side walls and the outside lagging is packed with dry rubble or rubble masonry. As the top drift is enlarged its supports are arranged to rest on the side walls as shown in fig. 4, leaving the material between the side drifts to be removed.

The brick work of the arch is built in 18-ft. sections, a section being commenced as soon as the excavation has been completed, in advance of the finished portion for the necessary distance. The arch is built in most places of five layers of Baltimore brick, but eight layers are used in some portions.

Air for ventilation is supplied from the exhaust of the drills in the headings, and also by special pipes supplied by air from a conductor located at the corner of Park avenue and Preston street and which also supplies hoist, drills and pumps. This condenser, the only one used in the work, has cylinder dimensions 18¼ in. diameter, with 24-in. stroke, runs at 94 revolutions and furnishes 683 cu. ft. of free air per minute. It was manufactured by the Ingersoll-Sergeant Drill Co. who also furnished the drills employed in the work.—*Street Railway Journal.*



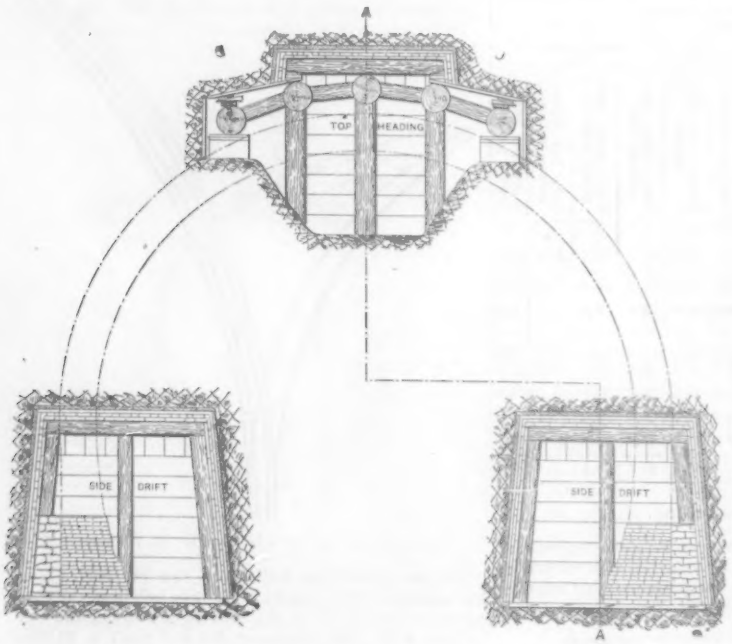


Fig. 3—Transverse Section During Construction.

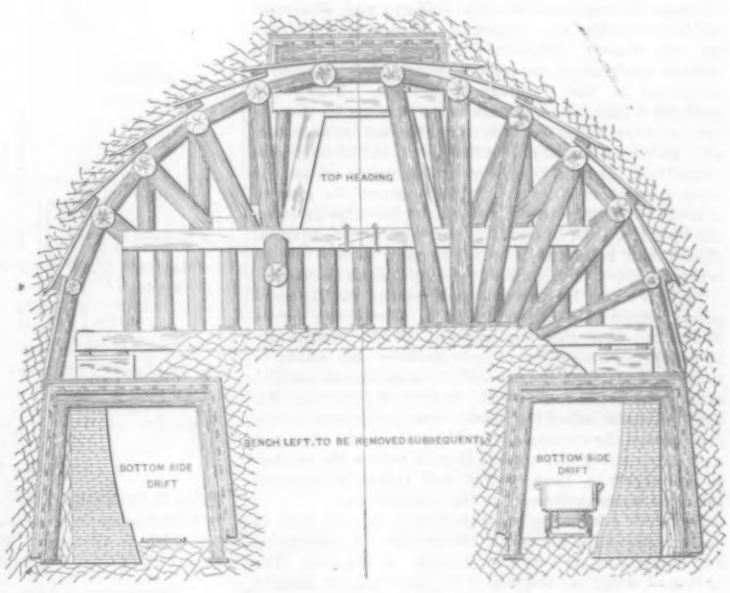


Fig. 4—Transverse Section During Construction—Top Heading Enlarged.

Tungsten Steel.

"Mushet's special" has been in the market for so many years that it is probable there are but few users of tool steel who are not familiar with its peculiar qualities. The majority, however, are not aware that it owes its property of becoming and remaining hard when cold, without the necessity for any hardening process, to the fact that it is an alloy of tungsten and ordinary carbon steel. Its extreme strength and hardness are due, principally, to the large percentage of tungsten, which it is possible to incorporate as a perfect alloy.

One of the chief advantages of its use for tools is that should they be heated by friction, as is so often the case, either in grinding or cutting, it does not impair their hardness in the least, whereas a tool of ordinary carbon steel would, under the same conditions, require to go to the tool dresser for rehardening. In all other respects there are many brands of steel tools which are fully equal to the Mushet.

It is not for tool purposes alone, however, that this property of tungsten is valuable. Its cost is low enough to admit of its use with the lower grades of steel, and the degree of hardness can be graduated to suit any desired purpose from the very hardest to the lowest temper. The requisite percentage of tungsten necessary to give the required temper can be calculated as accurately as can the carbon for ordinary steel. As an example of the lowest temper, that of a hot coiled spiral car spring may be cited. By careful comparative tests with a carbon steel spring made of precisely the same mixture as the other, but without the tungsten, its carrying capacity was about 20 per cent. greater; while its resilience or resistance to permanent set was about the same. After testing it was placed in the tempering furnace used for the ordinary springs, and after heating to full red heat was left in the furnace and allowed to cool with the latter. A more perfect annealing process could hardly be devised, as it required about 36 hours to cool it sufficiently to handle. It was then retested, and, strange to say, showed an increased carry-

ing capacity of about 5 per cent. and no further permanent set. Samples of the same steel, but with varying percentages of tungsten, were tried for different purposes, and were, in all cases, satisfactory. A chipping chisel was forged from it, and heated to full red after dressing and grinding. After cooling naturally it was tested on cast and wrought iron, steel and brass, and stood the roughest possible usage without injury. While these various tests were eminently successful they were barren of practical results, as the company in whose interest they were made discontinued business shortly after. As the difficulties of its manufacture are no greater than we experienced in ordinary steel making, and the cost of tungsten oxide being within the commercial limit, it seems rather remarkable that the use of this alloy should be confined to the one purpose met by the Mushet brand.—*Iron Age.*

Precise Levels of the Mississippi River Commission.

It is the custom of the Commission in the general survey of the river to run first precise levels, then triangulation, and lastly topography, the bench-marks of the levels serving as a basis for the subsequent surveys.

These benches are from two to three miles apart, and are mostly on the foundations of buildings, the piers of bridges, or natural ledges of rock, and are marked U. S. P. B. M. (United States Permanent Bench Mark). The exact point is the top of a small copper bolt, leaded into the rock. In case there are no buildings or natural ledges, the copper bolt is leaded into a hole in the centre of a slab of vitrified fire-clay 18 × 18 × 5 in., buried about 4 ft. in the ground and accessible from the surface through a 4-in. pipe. Besides these, temporary or ordinary benches are taken at the end of a stretch, usually about 1,200 metres apart. They are merely points of reference from one day to another, but are made as permanent as possible. Usually they are points on large embedded boulders or on foundations of buildings, or on spikes in the roots of trees.

The instrument used is what is known as the Swiss or Kern level. It has three leveling screws, an auxiliary tangent screw under one wye, a striding level with a radius of curvature of 380 ft., and three cross hairs for reading the rods. The latter are graduated to centimetres, and are read by estimation to millimetres and half millimetres. The rod is 3 in. wide, 1 in. thick, and 3 metres long, with a strip along the back to stiffen it.

Two rods are employed with each instrument, according to the method described in Baker's "Leveling" as System II.

The usual party is as follows: One instrument man or observer, one recorder, two rodmen, and two umbrellamen, one of whom under ordinary circumstances serves as axman, and in case of thick underbrush or other like obstruction an additional axman.

The length of sight varies from 40 metres to 125 metres, the average being about 70 metres (230 feet), except in extraordinary cases, as, for instance, a river crossing, where sights are 200 metres (650 feet) or over, when a series of observations are taken.

The cost of these levels varies greatly with circumstances, and runs from $15 to $35 per mile. The average cost, however, is about $20 per mile. One reason why this is so high is that only six or seven hours per day can be utilized, on account of the tremulousness of the atmosphere in the middle of the day. From 5 to 8 or 9 a. m., and from 3 or 4 to 7 p. m. are the best hours of the day.

All stretches must have two lines run over them, and the results of these two compared. The limit of difference allowed is 3 m. m· √dis. in kilom. (0.012 ft. √dis. in miles.)

The direct line between terminals is called the main line, and any other lines, such as connections with benchmarks, city datum, etc., are called the side line. In the work of 1891, between St. Paul and Savannah, a distance of 301 miles, there were 394 stretches in the main line and 300 in the side lines. Of these 694 stretches, 55 were run more than twice and 11 more than four times, on account of the results differing more than the allowed limit. The total length of the main line between St. Paul and Savannah is 486.09 kilometres. The probable error of the difference in elevation is 13.7 m. m. or 0.62 m. m. √dist. in kilom. (0.0026 ft. √dist. in miles.

The rate of progress for a double party was about 3,200 metres, or two miles, per day. The longest run made by a single party in a day was 5,600 metres, or about 3½ miles.—*R. J. Dickinson in The Technograph.*

A New Scale Car.

The Pittsburgh & Western has a new scale car arranged by Mr. J. L. Brown, Master Mechanic of the road which has some novel features. The body is 20 feet long by 8 feet wide, the frame having four channel iron sills thoroughly braced with cross braces riveted on and covered with a flat deck composed of 5-16 boiler steel and having a steel rail along each side, running lengthwise of the car to add weight and strengthen and brace the car.

On top is a box 6 ft. long by 3 ft. wide and 3 ft. high of No. 5 tank steel, with hinged lid, for holding the movable weights, which consist of 80-50 lb., United States standard, cast iron weights with handles. In order to eliminate all wood from the construction of the car, specially designed draft riggings of box shape were made of channel iron and well braced, continuous drawbars being used. The car has two 4-wheel trucks with 33-in. wheels and M. C. B. axles. The trucks have swinging bolsters made of 6 in. × 1⅛ in. iron, with cast iron liners and securely riveted. The brake beams are of iron, with four shoes on each for use on either standard or narrow gauge trucks. These different gauge trucks have the same weight each, so that the body may be transferred from one set of trucks to the other, leaving the weight of car the same on either gauge of track.

The car is provided with the Westinghouse automatic air brake and with pipes for air signals. This gives a standard weight of 25,000 lbs., including 4,000 lbs. of movable weights, the weight of body, trucks and weight being painted separately on the inside of the box for the benefit of the operator.

No wood or other material subject to change of weight by the weather is used in the construction of the car, and every precaution has been taken to avoid as nearly as possible any variation in weight by wear or accumulations of foreign matter.

New Style Punching Press.

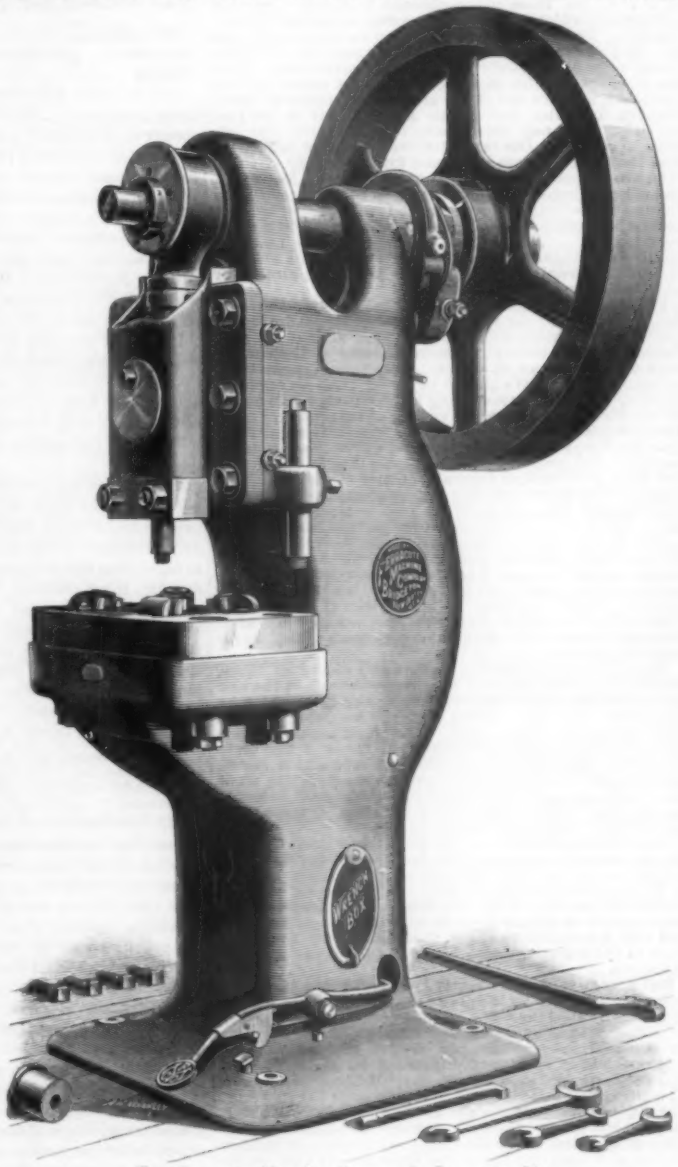
The accompanying cut shows a new style of punching press lately built by the Ferracute Machine Co., Bridgeton, N. J. The press has a number of features not embodied in other presses for the same kind of work. The frames are higher, with more bed room, and heavier and with larger fly wheels, thus giving a greater amount of power. They also have a new form of improved automatic clutch, adjustable for different speeds, and also adjustable when geared so that the press may be stopped either up or 30 degrees either way from top of stroke for special work. This clutch is so arranged that it does away with nearly all the friction usually necessary in an automatic clutch, and is very durable in its construction and is provided also with a safety-pin so that it is not necessary to remove the belt when setting dies. It is connected with the treadle, which has a lock arrangement so that the press can either be run continuously or stopped at each stroke, as desired.

The fly wheel has a steel disc with four recesses and the clutch-slide will engage every quarter revolution instead of waiting a complete revolution, as in most other clutches.

The slide-bar adjustment is of new form, to vary the height of the ram or slide-bar considerably, and it can be adjusted and locked in a moment. It is graduated so that each degree indicates $\frac{1}{100}$-in. in height, which is a very convenient feature in setting and recording dies. It can also be used in giving a series of blows with gradually increasing pressure. It has a special form of bolster plate with sliding clamps so that almost any dies can be held in it. The press has also a new form of stripper clamps and other features not embodied in other makes of presses.

There are five sizes of these presses, of which No. 53 is the middle one. There are also five sizes of corresponding presses with a gear wheel on the main shaft instead of a fly wheel, and with pinion and fast and loose pulley on the lower shaft, thus giving a slower motion which is desirable for various kinds of work and these have about 30 or 40 per cent. more power.

There are a number of attachments which can be used to advantage in these presses in the way of pan, shelf, etc., also shearing and punching apparatus of various kinds. These presses can be used not only for ordinary shearing and punching, but for cutting out blanks forming them up and a great variety of other work. They are especially adapted for railroad shops, hardware factories, cutlery works, etc.



The Ferracute Machine Company's Press No. 53.

The general dimensions of the press shown are as follows: Weight without extra appliances, about 3,500 lbs.; height, floor to top of fly wheel, 83 in.; hole through bed, front to back, 8 in.; hole through bed, width, 19 in.; stroke of slide bar, 1½ in.; weight of fly wheel, 735 lbs. Other dimensions are given for this press and for the other sizes in the price list issued by the company.

Advance Publication of the Papers of the Am. Soc. C. E.

Just before the last Summer Convention of the American Society of Civil Engineers, the Publication Committee issued a circular concerning advance publication of the papers and discussions of the Society. It was in effect that such publication must be confined to abstracts furnished by the Secretary, and that no other publication shall be made in advance of the appearance of the papers or discussions in the *Transactions*. This circular was not very favorably received by some of the members of the Society and by some of the technical journals. In fact, it raised a row and was suspended so far as the proceedings of the Convention went. We understand that the Board of Direction is now sitting on it. Meantime we have not felt called upon as a journal to say anything as to the merits of the case, for we felt that in the long run we should gain by the strict enforcement of the rule, and we should not be at all grieved to see it either enforced or repealed; we only ask that a clear and workable rule be made and stuck to. Some of our contemporaries, however, have taken a hand in, and what follows is one result.

NEW YORK, July 27, 1892.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Enclosed herewith I hand you a communication addressed to the Editor of *Engineering News*, publication of which has just been refused, although the communication was expressly prepared with the understanding, previously entered into, that it would receive a cordial reception. To answer in advance a possible technical contradiction, it is due the journal named to say that shortly after receiving its declination, and after I had sent for the rejected MS., a proffer was made to publish the article. But there are circumstances under which even gratuitous contributors may "decline with thanks," as well as editors.

In view of all the facts, direct and contingent, it appears to me that a public journal which lays more or less stress upon the fact of its being "reputable," having in each year fifty-one chances of rejoinder to but one of the outsider, and which then declines that one chance, makes a sorry showing as between its *theory* and its practice. I have not the slightest personal feeling in that my effusion was "declined," but it is my belief that it would afford more or less of satisfaction to many members of the Am. Soc. C. E. to see administered a short measure of *Engineering News* medicine, carefully prepared according to the formula, which it doles out to others but is evidently afraid to take itself.

It is doubtless hardly necessary to call to your attention that my criticism or discussion of the editorial inclosed is in no wise official, either as representing the Board of Direction or the Publication Committee of the American Society of Civil Engineers; but is simply as of one knowing more or less of the circumstances bearing on the several sides of the question, and, furthermore, who holds to the belief that commercial etiquette may properly be applied to societies of engineers as well as to firms of engineers. And to charge "unbusinesslike shiftlessness" upon the uniformly efficient management of the Engineering Societies would appear to be a slight lapse in the direction intimated.

I simply add that you are at full liberty to make such

use of this and the accompanying inclosures as you may desire. JOHN THOMSON.

The first enclosure is an editorial in *Engineering News*, July 7, which we condense considerably.

The plain effect of this wording was to prohibit any report of technical proceedings whatever other than what appeared in the advance "Bulletin" or than might (or might not) appear some months later in the "Transactions." It is needless to say that this amounted to a complete reversion of the established practice of the Society in a most important detail of its policy. . . . It is indifferent to us what further action in the matter may be had, except that, if we considered only our own comfort and profit, we should earnestly wish that this and all other technical societies would take and stick to the same position. . . .

The officers of such [technical] societies are, and ought to be, primarily anxious to do whatever will most promote the growth and influence of their own society. . . . Under these circumstances it is easy to see the arguments which impel to such action as that under discussion. They have a certain prima facie strength, and are in substance these: The society receives and publishes valuable papers. It wishes to receive more. They are published at the expense and for the benefit of the members, and are one of the greatest privileges of membership, for which heavy dues are paid. It is not just to those who pay these dues that technical journals should republish the text of these in full, or nearly so, and thus scatter them broadcast for the benefit of those who are not members, and do not pay dues. Moreover, the effect of such free publication is to deter men from joining the society. Moreover, "advance copies are subject to correction, and often subject to considerable alteration." . . . Moreover, the society has had the trouble and expense of making the engravings, and the technical journals can copy them photographically for next to nothing.

For ourselves, we heartily wish that not only the Am. Soc. C. E., but all the other societies of like nature would adopt an inflexible rule that nothing should be published in regard to any proceeding at any of their meetings except by way of abstract from their Transactions when published. We should be saved from an onerous, expensive and time-consuming labor without being open to any blame for negligence or lack of enterprise. . . . There would merely be some drops less in the bucket of possible "copy" which the wearied editor has to drink weekly. The general public has little idea of the pressure upon all technical journals of any standing in this respect. Our selections may not be always wise. Doubtless they are not, especially in any one reader's judgment, but it would be far easier for us to publish weekly a journal four times as large as we do, so far as "copy" is concerned, than to publish what we do. We have nearly always enough "left over" matter in type to make another paper, and in "copy" to fill three or four papers. There are few volumes, indeed, of society transactions, of which we should or could publish more than half in full, if the original copy were tendered us for our exclusive use. . . .

What the author needs is readers and plenty of them, or he fails of his object. That course which in the end gives him the most readers among the class which he addresses is the course which he will in the end prefer to take; and this fact, under present conditions, works powerfully in favor of the technical societies; because technical journals which are in any sense rivals never copy from each other, while all of them are quite ready to republish or abstract valuable papers read before engineering societies, if reasonable opportunity to that end be given them.

Thus the author of a really good paper may, by reading his paper before a society, reach not only the membership of that society, but also all the readers of four or five technical journals. We have repeatedly had this reason advanced to us for sending such papers to societies instead of giving them to us for first publication, and been compelled to admit that there was a certain force in the argument, at least, if less than the authors supposed.

But now suppose the restrictive policy in question is definitely adopted by any society, what is the effect? The author must then choose between seeing his paper published in some engineering journal and in the society's publications, because the only motive (barring rare exceptions) leads the technical journal to pay any attention to his paper– to satisfy an immediate curiosity as to its contents while it is yet fresh—has been taken away. The engineering journals get no credit for such republications, but rather discredit for not being purely original—except, indeed, as they do their readers a further service by winnowing the wheat from the chaff (of which there is an immense quantity), and they will and must insist on doing this in their own way and according to their own judgment. They are overcrowded even with original matter, and still more with "reprint" and "abstract" copy, the quantity of which is boundless. . . .

It is true that a large part of such delay in society publications is mere unbusinesslike shiftlessness and quite unnecessary, but we must take conditions as they are. Societies always have been careless in such matters, and always will be. This means that a few dozens or hundreds at most will read the papers while they are yet new, if they are to be read only in the society publications. The Am. Soc. C. E., for example, has only about 1,500 members in all, of whom not a baker's dozen have joined chiefly to receive the publications. Not one in a hundred would be any less anxious to join if there were no formal publications, except through the technical journals, provided of course the dues were correspondingly lower. They value the publications for reference purposes, of course, as one values a text-book or dictionary, but not for habitual perusal. With rare exceptions the members merely file away their copies, and bind them up from time to time to have them handy for reference.

On the other hand, the weekly edition of a successful technical journal is from three to eight times that of any American society publication in the first place; but, in the second place, whatever may be the relative merits and demerits of the two in other respects, the contents of the technical journal have at least the supreme merit of being read, for the very good reason that there is no conceivable motive for any one's taking it if he does not care to read it. It is true that there are a great many technical journals of an inferior grade in this country whose circulation is chiefly free, or they would have none worth mentioning. But with this journal at least (and the same is no doubt true of two or three other American technical journals), this is not done at all. There is no "free list," but every person is called upon yearly to decide anew whether he really cares to read the paper or not. Therefore, we feel safe in saying that that privilege is valued and exercised to a considerable extent by every person who takes the paper; otherwise, he would not take it.

If all these things are so, the true policy for engineering societies would seem to be rather to encourage than to oppose republication in full or in abstract of all papers read before them as soon after their publication as possible. They will not find that any alarming proportion of them will be published in full. Before a paper is read, of course, no society can permit its papers to be abstracted without diminishing the interest of its meetings, unless the abstracts are so made as to whet curiosity rather than to satisfy it, as seems to be the case with the advance abstracts so far published in the Am. Soc. C. E. "Bulletin." The technical journals can hardly be expected to permit their space to be thus used for mere advertising purposes or to resign the right to edit their own columns. And we repeat that, so far as their selfish interests are concerned, they do not care a button what the societies may or may not do about their publications, except that they would rather prefer to have the restrictions rigid, since they must apply equally to all, whatever they are.

The other enclosure is the following letter from Mr. Thomson to the editor of *Engineering News*, dated July 15.

The fact that your "free list" rule must but recently have been put into operation is my excuse for not having sooner read your editorial of July 7, entitled "Publication Rules for Society Proceedings." I find much therein to commend, besides noting with much pleasure that you therein utilize the faculty of judicial reasoning to an extent which, if continued, will leave but little to be desired hereafter in this direction; and it is realized that this is saying considerable when applied to an engineer editor. Nevertheless, this is another of those cases in which all the gravity of the court and judicial airing of its opinions fail to fit the law to the facts throughout.

I may not properly here take up the probable line of reasoning that resulted in the action of the Publication Committee which you condemn; for, although the reasoning may have been all wrong, the ultimate outcome of the action will, I am quite confident, be all right.

There are two points which you appear to neglect or overlook.

First—That the circular was addressed and presumably sent by the Secretary to every member of the American Society of Civil Engineers as well as to the editors and publishers of the technical press, as it was clearly in mind that the members themselves had been quite as derelict, if not more so, in their duty as the publishers.

Second—The second point is, that the Publication Committee did not make a new rule but sought to enforce one already in existence. Whether or no continued disregard had made it a dead letter is but begging the question. The notice printed at the head of advance copies clearly states the intent and the obligation as follows, in which the italics are mine:

"This advance copy is subject to revision. It is sent to you personally *for discussion only*, and with the express understanding that it is *not to be published* or *furnished for publication* in advance of its regular issue in Transactions of the Society."

This may be a bad rule, but it is submitted that every member of the society who became possessed of an advance copy ought to have felt bound to abide thereby. That they did not was the occasion for the circular in question.

A point concurrent with the foregoing is, what constitutes publication? This might be answered in several ways, depending, mayhap, upon the "judicial" cast of mind of those "wearied" editors whose chief functions are the cutting down of surplus copy. But a simple illustration may serve for an answer. Suppose I have succeeded in writing an article sufficiently good for, say, the *Engineering News* to publish, on an exclusive topic, agreeing not to furnish it to any other "reputable" journal in advance of its publication by you. After the article is in type, however, you cleverly furnish me with a "galley" or page proof for revision and correction. Upon receiving the article in type I say, "Go to now; it is published" and proceed forthwith to treat it in the manner in which you and your esteemed contemporaries have heretofore treated the "advance copies," or speaking more accurately, *proofs* of the Society. In my opinion any such action on my part would raise your editorial ire quite beyond the power of judicial language to express. In my opinion, furthermore, publication with the Society of Civil Engineers or any other society is, and ought to be, precisely as with yourselves, that is when the article is finally marked O. K. by the proofreader or author and then goes forth to the world in your journal. Upon this you stand or fall. Upon this your ability as an engineer-editor rests.

Please do not lose sight of the fact that I am not discussing the wisdom of the established usage of the Society in respect to the withholding of papers for the purpose of eliciting discussion, by reason of which their prompt appearance in the *Transactions* is prevented. This would be a tempting digression, but, while it might well be taken up, it would lead from the present question.

Throughout your editorial there is a "strain," more or less clearly defined, of placid resignation, or indifference as it were, as to whether you publish excerpts of society proceedings or not. This may do for the uninitiated, but not with those who have more or less to do with turning the editorial mill; besides which it does injustice to the reputation which you enjoy, for to compare the hastily written "space matter," the incongruous selection of "engravings" (*i. e.* photo-reproductions) and the often ill-advised selections of topics which too frequently appear in the technical papers to that of the Society articles, nearly always carefully worked up, puts your well known ability to unjust disadvantage.

The fact is, as you in truth ought to admit, that the quality of the majority of *Transaction* articles is above the average of the articles in the technical press. To say this is no disparagement to the technical press, for in the one case it is a question of *must*, the urgent pressure of circumstance and necessity, often of policy and expediency; in the other case there is time for deliberation and care in preparation, and nearly all questions of revenue and policy may be eliminated; consequently the result is exactly in accord with good sense and engineering experience, that the work which receives the most complete attention in its initial working-up usually comes out best as a finished product.

Respecting your summary as to the relative merits of society publications *versus* the technical press (*Engineering News!*) you seem to have here also overlooked an important element of the proposition. The author of a paper, in the preparation of which any considerable amount of labor has been expended, if he is made up of the ordinary combination of mind and matter, will have the first regard to its *permanency*—will it live, will it endure? Said a Scotch friend of mine, soon after the exceptional hospitalities extended to the visiting engineers of 1889 to England: "What, dined in the Guild Hall? Weel, weel, that was something to live for! Now, mon, your name will go down into history!"

I am aware that I am now upon the verge of "ticklish ground," so to speak; that one subject of all, which even the editor of a "patent outside," whose advertisements are traded for produce, will defend with his last gasp. But let us be honest in this matter. Let us, as said rugged Carlyle, "Strive to keep a free, open sense, cleared from the mists of prejudice; above all, from the paralysis of cant." Instead of the technical press being read with the uniform thoroughness which you opine, it is, relatively speaking, but skimmed. Instead of being retained a permanent lasting record, as in the instance of *Transactions*, in a few weeks or months at most the current weekly periodicals find their way from whence they came—the waste basket and the paper vat. This is my own experience. I know it is that of every engineer friend of my acquaintance, barring only yourselves, and even as to you I have grave doubts.

The *Transactions* may be in some respects something of a sentiment. So be it, there might be a worse. But there is no doubt in my mind as to the possibility of their development, and the conditions are such as to obtain what can never be reached through private enterprise based on considerations of profit. The editorial mind has not yet been evolved that can separate the two, however much it may desire to do so. Therefore, as the fundamental conditions inhere in the Society, let us strive not toward their disintegration but to the building thereupon of a structure abreast of the times and the thought through which we are passing.

If I may be permitted to suggest, it would, therefore, seem that your duty toward the *Transaction* editors in their "onerous" and "time-consuming labor" lies rather in the direction of upholding the principle that the proper place from whence to lift your Society articles is from the published *Transactions* and not from the *proofs* thereof. This, in my opinion, is the direction in which real improvement may be expected to arise in the literary character of the Society papers. In furtherance of this your influence would be directed to the best good of all. I do not neglect to observe that there are some journals, but probably those whose circulations is bounded within the membership of the engineering societies, that may contend that such publication from the *Transactions* would "not be news." But if the *Transactions* of the Society are to be regarded as a newspaper, published "for revenue only," then I am not in the argument; for I contend that what appears in our *Transactions* ought to be *news* to everyone not a member, as also to those members who may not be present at public meetings of the Society. Ergo, it would be none the less *news* when excerpted or "lifted" from the *Transactions* to the needed hiatus of the technical press.

Truly, much less time may elapse between the presentation and publication of Society papers. And this leads to the assertion that prompt and regular publication, improved typography and binding, are improvements to be desired, and will do much to draw to the *Transactions* of the American Society of Civil Engineers the highest grade of engineering articles. Then will a new, and mayhap the highest, function of the Society be evolved, the forming of a magazine from whence the editors, now so brain weary, will draw their most valuable stores of information; whereby, upon due and proper credit to the *Transactions*, they will scatter broadcast upon the land even more of the "wheat" and less of the "chaff!" To this good and altogether proper work, Messrs. Editors, I in good faith and conscience commend you. JOHN THOMSON, *Mem. Am. Soc. C. E.*

Form for Monthly Accident Record.

The table printed herewith shows the form of accident record in use on a prominent western road. A chief use of tables of this kind is to circulate among division superintendents, in order to stimulate a proper spirit of emulation so that the record of the most carefully man-

X. Y. Z. R. R.—ACCIDENT REPORT; MARCH, 1892.

No.	Division.	Cause of Accident.	Nature of accident.	Nature of Damage.	Cost.	Action Taken.
2	A	Defective rolling stock.	Derailment.	Wheel broken and track damaged.	$11	None.
6	"	" machinery.		Side rod broke, etc.	201	"
9	B	" "		Engine stripped herself.	75	"
10	"	Log fell from car.	End of log struck car.	Car damaged.	57	"
12	"	Careless conductor and engineer.	Rear end collision.	Platforms damaged.	98	Conductor 30 days; engineer 10 days.
13	"	Defective machinery.		Cylinder head broken.	25	None.
14	"	Careless engineer and yardmaster.	Derailment.	Engine and cars damaged.	372	Engineer and yardm'ster discharged.
15	"	Drawbar fell from car.	"	Brakebeam broken.	16	None.
20	"	Car stakes broke and logs fell off.		Caboose damaged.	27	"
21	"	Car improperly loaded.	Derailment.	Car damaged.	10	"
23	"	Defective track and careless engineer.	"	Hose, tire, etc., broken.	18	Engineer 10 days.
25	C	" rolling stock.	"	Axle broken.	15	None.
27	"		Broke apart.	Drawheads and sills broken.	20	"
28	"	Snow on track.	Derailment.	Truck frame broken, etc.	76	"
29	"	Careless brakeman.	Yard collision.	End sills and siding damaged.	125	"
30	"	Defective track.	Derailment.	Pilot plow damaged.	12	"
32	"	" machinery.		Cylinder head broken.	50	"
33	D		Broke apart.	Cars generally damaged.	164	"
34	"	Open switch.	Derailment.	Front end of engine damaged.	42	"
35	"	Failure of air brake.		Tail pieces broken, etc.	26	Referred to machinery department.
37	"	Defective rolling stock.		Flange broken.	10	None.
38	"	Ice on rail.	Derailment.	Pilot plow broken, etc.	10	"
39	"	Defective track.	"	Oil boxes and truck bolts broken.	15	"
40	"	High wind.	Cars blown from coal dock track.	Bodies broken.	400	"
41	"	Careless switchman.	Yard collision.	Miller hook bent.	10	Switchman 10 days.
42	"		Broke apart.	Draft timbers and sills broken.	35	None.
43	E	Defective rolling stock.		Wheel broken.	20	"
44	F	" " "	Derailment.	Trucks broken.	50	"
45	"	Defective machinery.		Strap and cylinder head damaged.	46	"
48	I	Wood on track.	Derailment.	Brake and snow plow damaged.	37	"
50	J	Careless conductor and brakeman.	"	Trucks and track damaged.	125	Cond. disch'g'd, brake'm'n 10 days.
					$2,098	

aged division may be matched on other parts of the road; and we show this form that superintendents of other roads may compare it with their own. Following the column showing the division are columns for the date the number or kind of train and the place of the accident. These we omit. The rule in making this report seems to have been to exclude all accidents costing less than $10 each.

It will be remembered that we have on several occasions given the average cost per train mile, or per freight train mile of accidents on certain roads from which we have obtained statistics; we have not made such a computation in this case, however, for the reason that the average for a single month is of little value. For those who are curious we will state, however, that tht length of road covered by this report is 4,413 miles, and the train mileage for the month in question was 926,443.

This report furnishes a suggestive commentary on the monthly accident records printed in the *Railroad Gazette*. Here was a loss of over $2,000, and yet not one of the cases appeared in our record. It must be borne in mind that that record, condensing facts from such a vast field, can give only the salient points. An exceptionally favorable record for any given month is not conclusive evidence of a favorable financial record in the superintendent's office; though it is evidence of carefulness, and therefore presumptive evidence of good fortune in all departments of the service. The half dozen accidents in this report in which the damage was $100 or more each, would very likely have been recorded in our list, if they had occurred on an Eastern road where the newspaper reporters are scattered around more thickly, though even then the details would not appear, as no person was injured.

The difficulty encountered in classifying the causes of accidents is illustrated by case No. 23, in which the blame is divided between two different departments.

In the following classification, which we copy from the report, it will be observed that the term "fault of employés" does not include all the cases that would naturally come under that head, being apparently limited to negligence of trainmen. "Improper loading," and "open switch" would, of course, come under the same head, as also numerous cases in the other classes. It will be observed that in each of the three cases of a train breaking in two the cause is not determined. In our monthly record we always class these cases as due to defects of equipment, though it is, of course, true that many couplings, which break in "pitching over a summit," or in passing through a sag, would remain intact if enginemen and conductors always intelligently co-operated in managing the slack carefully.

The table is supplemented by the following summaries, and there is also a summary of the number of employés of each class discharged and the number of each class suspended:

Classification.

Defective rolling stock	5	$106
" machinery	5	397
Load fell from car	3	100
Fault of employés	6	648
Wood on track	1	37
Improper loading	1	10
Snow and ice on track	2	86
Defective track	2	27
Open switch	1	42
Failure of air brake	1	26
High wind	1	400
Broke apart, cause not determined	3	219
Total		$2,098

Cost, by Divisions.

Division A	$212
B	598
C	298
D	712
E	20
F	96
G	...
H	...
I	37
J	125
K	...
Total	$2,098

TECHNICAL.

Manufacturing and Business.

The Falls Hollow Staybolt Co., of Cuyahoga Falls, O., has recently received trial orders for its hollow staybolt iron from the Louisville & Nashville, Union Pacific, Michigan Central and the Chicago & Grand Trunk road.

The Maris Machine Co., of Philadelphia, reports a large business and during the last two months has been obliged to run its shops night and day to keep up with orders. Among the shipments to be made shortly is a 15-ton crane to a New Orleans firm; two 8-ton cranes to Pennsylvania, and a 2-ton traveling crane to Albemarle, Va. The firm also has large orders for overhead track, portable hoists and turn tables from the Boston & Montana Consolidated Copper Co. for shipment to Great Falls, Mont.

Articles of incorporation were filed in New Jersey last week by the Nebraska Construction Co., to construct bridges, railroads, etc. The capital stock of the company is $10,000. The incorporators are Eugene P. Janke, Henry Schauffer, Charles O. Kruger and William W. Laughlin.

The Automatic Refrigerator Car Co. has been organized at Portland, Maine, to manufacture railroad appliances and rolling stock, with $250,000 capital stock, of which $500 is paid in. The officials are: President, David Dennis, of Gardiner, Me.; Treasurer, George G. Hackett, of Wakefield, Mass.

The Hancock Switch & Frog Co., of Manchester, N. H., has been formed for the manufacture of railroad appliances, etc. A. J. Hodden, Samuel G. Lane, J. Whitney Beal, Jr., F. C. Twombly and James C. Lovejoy, of Manchester, N. H., are directors.

The Illinois Engineering & Construction Co., of Chicago, has been chartered by John C. Slocum, Edward J. Tenlon and Hamilton S. Wicks, capital stock $100,000.

The Illinois Railway Construction Co. has been incorporated by William E. Shaw, John M. Armstrong and William P. Dewey, Jr., of Chicago.

Application has been made to the Dominion Government by William Wainwright, Assistant General Manager of the Grand Trunk, Montreal; Samuel Insull, President of the Chicago Edison Co.; James Leggat, of Montreal; Isaac Anderson, Toronto, and Marshall Barr, Canadian Manager of the Edison General Electric Co., Toronto, for incorporation as the National Trust & Construction Co. (Limited), of Toronto, to manufacture rolling stock. The capital stock is $500,000.

The Rail Market.

Steel Rails.—There is no change in the condition of the market in the West. The prices for rails remain the same, at $31@$32.50, standard sections; angle plates at $1.75@$1.80, iron or steel. Track bolts, with hexagon nuts, are quoted at $2.65@$2.70, and spikes are quoted at $2.05@$2.10 for car load lots. The market remains about the same as has been noted the last few weeks. And this can also be said of the market in the East, where the mills continue to quote $30 at the mill.

New Stations and Shops.

The new roundhouse of the Pittsburgh, Shenango & Lake Erie at Greenville, Pa., with 20 stalls, is about completed. Other buildings to be erected will be a boilerhouse, a blacksmith shop and a storehouse.

Plans have been completed for the new Chicago & Northwestern passenger station at Rockford, Ill. Work on the structure is to begin at once. It will cost $75,000, and is to be built on South Main street.

The town of Lafayette, Ind., has voted $130,000 for the removal of the general shops of the Louisville, New Albany & Chicago from New Albany to Lafayette. The shops are to employ 600 men, and it is stated the company has agreed to expend $200,000 in addition to the subsidy of Lafayette.

Plans for a new bridge roundhouse for the Northern Pacific at Spokane, Wash., have been prepared, and work will probably be commenced immediately.

Work on the new Baltimore & Ohio yard at Benwood, near Wheeling, W. Va., is progressing rapidly. There are now nearly 50 side tracks in use, and others are being built. The new round house has stalls for about 100 engines.

The New York, New Haven & Hartford expects to build a new office building at New Haven, Conn., plans for which have already been made. It will be of L shape, 230 × 200 ft. and 60 ft. in depth. The company does not propose to build a new station as reported, but it is intended to retain and use the present passenger station for some time, or at least until the increase of business requires a new one.

The contract for the erection of the Philadelphia & Reading Terminal station will be awarded on Aug. 9. Detailed drawings have been prepared by Wilson Bros. & Co., of Philadelphia.

The Philadelphia & Reading has decided to build a new passenger train station on Spring Garden street, between Ninth and Tenth streets, Philadelphia, to accommodate the travel from the vicinity of the present depot at Ninth and Green streets. Detailed plans are now being prepared. It will be a two story structure, and built of ornamental brick and stone. The second story will be on a level with the elevated track of the terminal.

The Midvale Steel Co. is building an extension of its plant at Nicetown, Philadelphia, which, it is said, will cost $100,000. The building will be a brick machine shop 150 × 198 ft., and will soon be under roof.

Press dispatches from Duluth, Minn., announce the purchase of a tract of land for a new union station, to be occupied by all the roads now entering Duluth and two others which are now building into that city. The report states that the price to be paid for the land is $150,000, and that the union station to be built will cost half a million more.

Northumberland Straits Railroad Tunnel.

Mr. Palmer, engineer in charge of the surveys for the submarine tunnel which are now being made between Prince Edward Island and the mainland, proposes a new plan, which will shorten the length of the tunnel by nearly 1¼ miles and the approaches 1¼ miles. The plan accompanying Sir Douglas Fox's report made the length of the tunnel between portals about 8¼ miles. This result is obtained by increasing the gradient of the tunnel on both slopes. The former proposal was to have the grades 80 ft. to the mile; Mr. Palmer's proposal is now to make the gradient 105⅔ ft. a mile. The present survey is preliminary, and is being made at the instance of the Dominion government, to get a more or less definite idea of the cost of the work. The construction of the tunnel is entirely problematical, and of course methods of driving it have not been taken up. The idea, however, has been to work with two shields as in the St. Clair tunnel. Mr. Palmer's invention is a caisson or metallic cylinder which he proposes to sink at intervals of about a mile along the proposed route of the tunnel. When sunk to the proper depth a disc will be cut out near the bottom, forming a door, through which the workmen can go on excavating, and the matter excavated will have a comparatively short distance to be carried, and can then be hoisted to the top of the caisson by machinery and dumped over into the sea, thus saving the labor and expense of cartage. The advantage claimed for these shafts will be that gangs of men can be employed excavating simultaneously toward each other at mile intervals; thus Mr. Palmer states that instead of taking six years to build the tunnel, as estimated by Sir Douglas Fox, the work can be done in two years. The caissons of course will be temporary and will have to be removed, excepting those near the shore during the winter months. The current in the strait is so strong that it is believed that it will carry away the excavated matter without danger to navigation. The caisson will be built up with metal plates as it descends. The cost of a tunnel wide enough for a standard gauge track (the gauge of the Island road is 3 ft. 6 in.) would be by this method $6,000,000, the estimate of Sir Douglas Fox being $9,859,000.

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

In Mr. Blodgett's communication, which appears in our first page, mention is made of a case in which a serious accident was prevented by a derailing switch. Mr. Blodgett uses the circumstance to point a moral as to the lighting of signals. We call attention to it as pointing a moral as to the use of derailers. The facts briefly are these: The place was a grade crossing, protected by interlocking signals and derailing switches. The way was made and signals set for a passenger train. A freight train approached the crossing on the other track with the signals against it, and the switch set, of course, in the derailing position. The lower two-thirds of the red lens in the semaphore signal was broken out, and although the runner thought the light was red when he first sighted it, he saw, as he approached it, that it was white and so kept on for the crossing. The result was that his train went into the ditch and the passenger train which was on the crossing at that moment was saved from what might have been a dreadful wreck. Of course, we are quite familiar with the objections made to the use of a derailer and there is no doubt that it is undesirable to introduce into main line track any more facing point switches than are absolutely necessary. There are those who think it is a bad principle to prevent one accident by causing another. This, is, however, a choice of evils. The facing point must be properly cared for and in high speed tracks should be locked. Presumably, it will always be better to send a train off the track in a comfortably soft place and where there is no high bank for it to roll down, than to let it hit the side of another train which might be crossing its course at a greater or less angle. In the latter case you would get two derailments instead of one and about the worst kind of a collision. While we are on this matter of protecting switches and crossings, we would call attention to the fact that within a week an accident has happened involving a "limited" passenger train; presumably, because the switch was not protected by a distant signal. The train ran into an open switch on which a freight train was standing, and three men were killed. The cost of the accident would probably have installed and maintained distant switch signals for a considerable part of the line in question for some years.

We give this week drawings of one of the most interesting freight cars that has come to our attention for some time. It is a steel car used on the Mexican Railway and built at Manchester, Eng. The framing is entirely of steel and riveted together. The covering is of galvanized, corrugated iron, about $\frac{45}{1000}$-inch in thickness. These cars are 96 feet long and of large capacity. Unfortunately we have not the weight, but from the construction it is evident that they weigh but little, if any, more than the 34-foot wooden cars used here. From private advices we are informed that these cars are very successful and the future equipment will in general be made in this way. The passenger cars on this road have steel underframes and the trucks are of pressed steel, the same as for the freight cars.

The Trolley in New York City.

New York City has now to face a very important question, that of using or not using the trolley system for street car propulsion. To begin with, a continuance and enlargement of the present inadequate, slow, and unclean system of horse cars is unthinkable. As it stands to-day, the largest and most important city of the United States has about the worst street transit system to be found in any large city in the land. The elevated roads we do not include in speaking of the street transit systems; they are admirable, with all their faults. Other cities in this country have far better and quicker arrangements for handling street passenger traffic, and in some small Western towns the double-truck cars, moving at a speed varying from 10 to 20 miles an hour, furnish a means of rapid transit that compares favorably with the elevated road in New York City.

It is not to be supposed that the citizens of New York are not alive to the latest progress, or to the needs of their great city. New York is the birthplace of most of the schemes for rapid transit and nearly all systems but the trolley have been tried on its streets. The storage battery was a failure. The cable on Tenth avenue has been a success, but the demands upon it are small compared to real rapid transit requirements. The cable on Broadway is not yet in operation, but whatever its success may be, it is not probable that the crosstown lines could stand the fixed charges and heavy repairs of a cable system.

What is wanted is a less expensive means of rapid transit with no experimental features and one that will permit running frequent cars at a good speed without increasing greatly the cost per passenger. Such is the trolley-wire, electric system, and the experience of other cities justifies its claim for simplicity, cheapness and efficiency. It has disadvantages and they are such that they have caused the adverse decision of the city of Philadelphia for all lines and the city of Chicago for all lines in the thickly settled portions.

The problem then in New York, apparently, is to choose, on one hand, between the unsightly poles and wires, the danger to men and horses from live ends of broken wires, the obstruction to the fire department ladders and apparatus, the interruptions to telegraph and telephone communication, and the general rascality of bare electric wires, offset, as these evils would be, by the most efficient means of street travel yet devised by man, and on the other hand, the present dirty, cruel and wholly inadequate horse car system. We say *apparently*, because it is only on the face of matters that such a choice is necessary. If the public dig deeper down into electric matters it will find that there is a way out of the woods that will do away with the need for a troublesome analysis of great and small inconveniences and disadvantages such as are possessed in common by the trolley and the horse systems. Our readers will remember that in Fulton street there was once laid a conduit for the reception of electric conductors that has never been used. One of the same sort is now in use in Allegheney City. Another is running so successfully in Chicago that it has caused the veto of grants for trolley systems in Philadelphia, and in Chicago it will be extended to replace one of the cable systems. Another conduit system was tried in Boston and removed to make room for the trolley. In Europe there are several conduit systems in operation with good reports of success. All of the advantages of the electric systems of street car propulsion are to be had in the conduit system with not a single one of the disadvantages that we have named for the trolley.

One naturally asks, then, why the conduit has not been pushed ahead and why it is not more used. The answer is simple. It costs three or four times as much, and its use would hamper the formation of street car companies and choke the flow of capital for street transit work. A conduit system used extensively enough to remove all doubt of its entire practicability and in any place where there is enough traffic to prove its value, would decrease in a considerable degree the number of miles of new street railroad laid per year. Grants for trolley lines would be made even more reluctantly than now if the conduit stood out as a competitor. For all these reasons the conduit has no champion, and will not be used until the public insists upon it.

It is said that the conductors in the conduit give trouble. How about the Allegheney, Chicago and European conduits? They are still running and taking the five cent fares. The conduit system takes the same cars, the same truck, the same motors as the trolley. The machinery for propulsion is, therefore, no experiment. The conduit system requires but a smaller, cheaper and simpler conduit than the cable railroad. Hence the conduit, *per se*, is no experiment. The conductors are bars of copper held by insulators, and there is ample room to make them of any size and efficiency that may be required. To the layman, there would appear to be no problem in the insulation, where both the conductors and the insulators are protected, as they are in a conduit, which compares with the problem when the conductors are exposed as they are for the trolley system. The slot in the street that is ample to allow for a cable grip that has to be of sufficient power to haul four-car trains is certainly ample to give room for a current collector that has only its own friction of contact to overcome. So on, we might consider each mechanical detail of the whole question—the strictly electrical features are fully settled by the success of the trolley—and in each case quickly show the simple problem that remains to be solved to give a successful conduit, electric, street transit system for any set of street traffic conditions, no matter how severe. The problems are all mechanical, not electrical, and when solutions are once really sought they will be readily found, and a consideration of the unsightly, dangerous and annoying trolley obstruction will then be seen to be as it now is, wholly an unnecessary perplexity.

Let those who are interested in the welfare of New York City and in the maintenance of its limited clear sky view, the safety of its people and the efficiency of its fire department, insist that a trolley system shall not be used in the city and prove that they are resolute in their determination that it shall not be, and we venture to say there will very soon be a working conduit system brought forward.

The Papers of the American Society of Civil Engineers.

Last May the Committee on Publications of the American Society of Civil Engineers issued a circular in which the following sentences occur:

> Owing to the fact that the printed notice at the top of the "advance" copies of papers has been misunderstood or disregarded to such an extent that the papers of the society are often printed practically in full, before they appear in the *Transactions* of the Society, the Committee on Publications have adopted the following rule: Abstracts of papers will be published, as far as practicable, in the Bulletin, and generally in advance of the time they are to be read. Such abstracts may be republished immediately, but no other publication of the papers in advance of their appearance in the *Transactions* will be permitted without the written approval of the Secretary. This applies to discussions as well as to the papers themselves . . . No paper will be published in the *Transactions* which has been previously published elsewhere; and the Society owes it to itself and its members to guarantee that originality of publication which it demands from them.

We have heretofore dodged discussion of this circular, which stirred up considerable language, and the end of which is not yet. Circumstances have at last dragged us out into the light and we must commit ourselves. The writer of these lines can speak of the matter as an editor and as a member of the Society. While he yields to no one in his desire for the good and glory of the Society his first duty is to the paper which he is allowed to conduct.

Speaking then as an editor he has thought that the rule made by the Committee on Publications was a good one and would ultimately result in gain to his paper, for several reasons. There would no longer be any doubt as to what would be an allowable abstract of any given paper, or any discussion. The editor would no longer have to consider the wishes of the author or of the officers of the Society in deciding how much or how little to publish. He would no longer be annoyed to find that a less careful contemporary had interpreted "abstract" to mean nine-tenths and had taken the bloom off the peach. He would no longer have to go to meetings and conventions and try to make an intelligent report of a diffuse, or a closely technical, verbal discussion. He could wait until the whole matter was in print in its final form, and then sit down in the cool, dry light of his library, and let his intelligence play around the subject and finally produce an abstract that would be an abstract indeed—compact, lucid, comprehensive, and embellished by his own elegant and learned notes. That is, he could if he were "smart" enough. It will be seen at once what an enormous difference there would be between such a process and that now carried out in a dusty office with a blue pencil, paste-pot and scissors.

But the greatest advantage to this journal appears to be that whatever makes it hard for a man to get before the public through the *Transactions* of the American Society of Civil Engineers makes him the more likely to bring his writings to the *Railroad Gazette*. If he finds delays and restrictions there he will come here,—if he is as wise as we take him to be. The editor sees in the rigid enforcement of the Committee's rule personal comfort for himself and ultimate gain for his journal. Therefore he waits with serenity for the outcome.

But the member of the Society is not so sure. If the

theory of the editor is right the Society would lose some papers, and that would be an undoubted misfortune for the Society. Again, advertising and circulating the paper through the press will probably increase the discussion of it before the Society, for it is hardly likely that advance proofs are sent to all who might discuss a paper if their attention were called to it. Still further, we conceive that the best purpose of the Society is to spread intelligence, and whatever curtails the circulation of its papers and discussions lessens its influence to that degree. The question then is will the papers of the Society be less reprinted by the technical journals if they are held until they appear in their final form in the *Transactions*? Somewhat less, unquestionably. We do not attach very great importance to the notion that they will have lost their freshness, but it should have some importance. To those readers of the newspaper who are members of the Society the matter will no longer be fresh; but after all they are, numerically, not a great percentage of the newspaper's readers. Otherwise, most of the material published by the Society will be just as fresh three months from now as it is now. It is not "news" to begin with. In the case of some one Society paper, where an editor is in doubt as to whether or not he will reprint it, or as to the space to give it, the fact that it is already in the hands of some of his readers will make him decide against it; but the more important papers will be reprinted just about as freely if they are held till they are published in the *Transactions* as they are now.

There are some advantages in holding a paper from publication until it has been discussed, and these may sometimes be very important. To be sure, there are three things that return not—the sped arrow, the spoken word and the lost opportunity; but we would give to those who write papers for the societies every reasonable opportunity to modify their writing in the light of discussion, and to consider the words uttered before the society as not actually spoken until they have such opportunities. Probably many a man would write who does not write now if he knew that his words, once read in the hall of the society, need not go into the immortal pages of the *Transactions* or of the technical newspapers until he had a chance to correct them in the light of the opinions of other members.

We have pottered along much further into this matter than we intended to go when we started, but if any member of the Society cares for our suggestions, here they are: The Committee on Publications was quite right in calling attention to a disregarded rule. The rule is right and should be enforced, or it is wrong and should be repealed. The question of permitting the publication of advance abstracts is one of opinion, and not to be settled out of hand; but, on the whole, it would be better for the Society to let editors make pretty free abstracts from advance proofs, *if the author is willing*. Some attempt should be made to define the limits of the abstracts; that would be hard to do reasonably. But if no reprinting is allowed until the *Transactions* are published, the Society will not perish from off the face of the earth, nor will its usefulness cease.

Are Taxes on Railroad Gross Earnings Constitutional?

The case of the Northern Pacific Railroad Company against Charles S. Walker, County Treasurer of Cass County, North Dakota, and various other county treasurers of that state, was argued before the United States Circuit Court of Appeals at the term of that court recently held in St. Paul, Minnesota. The question discussed was, whether the statute of 1889 of North Dakota, providing for a tax upon the gross earnings of railroads, in lieu of all other taxation, was constitutional. The case is one of considerable interest to the people of the Northwest in view of the fact that this system of taxation has, for some years, been in effect in that section of the country.

The following statement will give a notion of the question involved. In 1879 the Territory of Dakota passed a statute which provided that, in lieu of all taxation upon the property of railroads, used in the actual operation of the railroads, the companies should thereafter pay 3 per cent. upon their gross earnings in the territory. As our readers are doubtless aware, the Northern Pacific Railroad Company possessed a large land grant in the Territory of Dakota. This statute did not exempt such land grant from taxation. However, in 1883, a second act was passed wherein it was provided that the land grants of railroads should also be exempt from taxation upon the payment of a specified percentage of the railroad company's gross earnings. Notwithstanding this statute the various counties through which the line of the railroad ran levied taxes upon the company's land grant for the year 1887. The company brought an action against the county treasurers to restrain the collection of this tax, claiming that the lands in question were exempt from taxation by virtue of the law of 1883. The counties contended that the Fourteenth Amendment to the Federal Constitution, which provides that no state shall deny to any person within its jurisdiction the equal protection of the law, prohibited the territorial legislature from passing this law exempting the land grant from taxation.

The question was argued before the Supreme Court of the state of North Dakota and an opinion rendered on Jan. 12, 1892, which held that it was within the power of the territorial legislature to pass the act. The question as to whether it was within the power of the territorial legislature to exempt the company's land grant from taxation was squarely raised at the argument and decided in the opinion of the Supreme Court of North Dakota. The decision will be found in Vol. 51 of the *Northwestern Reporter*, p. 386. The Court held, in substance, that the land grant of the Northern Pacific Company constituted a distinct and separate class of property and was surrounded by such limitations, in regard to its use and disposition by the company, as to warrant the legislature, notwithstanding the Fourteenth Amendment, in placing it in a class by itself for purposes of taxation.

While this case was awaiting decision, the territory of Dakota was admitted into the Union as the state of North Dakota. In the meantime, taxes had been levied in subsequent years upon the land grant of the company, and this action was brought by the company to enjoin their collection. The action was commenced in the Circuit Court of the United States for the District of North Dakota, and was thence appealed to the Circuit Court of Appeals, being argued, as above stated, at the recent session of that court at St. Paul. After full argument, the Circuit Court of Appeals certified the case up to the Supreme Court of the United States for decision, stating that the question was of such importance that it required the decision of the highest court of the land in order to determine the rights of the parties.

The determination of this question by the Supreme Court of the United States will be awaited with great interest by all the property owners of the Northwest. Wisconsin, Minnesota and North Dakota have, for years, adopted the gross earnings system of taxing railways. Should it be held that the laws creating such exemptions are unconstitutional, as being opposed to the Fourteenth Amendment a grave question will arise as to whether the entire tax levies of such states, made during the existence of such laws, are not unconstitutional and void, for the reason that the exemptions created by such laws have generally been recognized and the property assessed has been left off the assessment rolls. The exemption of this property necessarily increases the tax upon the property included in the assessment. It follows that owing to this omission, the taxes levied upon the property included in the assessment are greater than they would have been had all the property been included in such assessment. If, therefore, railroad property was wrongfully excluded, it would seem as if the taxes levied upon the property included in the assessment were void. The effect upon the revenue system of the various states where the gross earnings method of taxation has been invoked for a great many years cannot be estimated. It would seem as if a decision holding that these gross earnings laws are opposed to the Fourteenth Amendment would invalidate every assessment made since their passage, and would render void every tax title originating since that time.

In view of the fact, however, that for some years the validity of the North Dakota law was recognized both by the company and the executive officers of the state, and of the further fact that the Supreme Court of the state has expressly held that it did not violate the Fourteenth Amendment, it would seem as if there is little danger that the Supreme Court of the United States will do otherwise than follow the decision of the Supreme Court of North Dakota.

Coke to Prevent Smoke from Locomotives.

Those who are interested in the reduction of smoke in Chicago will be interested to learn to what extent coke has been successful in preventing the smoking of locomotives operating within the city limits. We have several times referred to the fact that the Burlington and some other roads are using coke within the city limits, but one road, the greatest sinner in the matter of smoke nuisance, has not paid much attention to the reduction of smoke, although it has made some attempts in the way of using anthracite coal and the application of smoke prevention devices. On the elevated road, where all smoke must be suppressed, coke has been used to some extent since the opening of the road. The experiments there show that the use of coke is entirely practicable and almost no difficulties have resulted, at least, so we have been informed by the master mechanic.

On the Chicago, Burlington & Quincy a small supply of coke is put on the engines as they leave the coaling station to go into the Union station for a train. This amount of coke is about sufficient when placed on top of soft coal in the firebox to prevent smoke until the engine has hauled the train outside the city limits.

Coke is considerably more expensive than soft coal, therefore much of it will not be used until more pressure is brought to bear on the railroads than has been up to the present time. So far, as long as the railroads have been willing to use the smoke prevention apparatus that has been recommended by city authorities, no complaint has been made about the engines, even when the smoke is as bad as before the apparatus was applied. In fact, some railroad officers have said that the cheapest way to get rid of the nuisance caused by complaints was to use the devices recommended, and that it was not so much a question of reducing the smoke as of using favored devices. The apparatus generally applied for locomotives in Chicago, consisting principally of a steam jet, will only remove smoke under favorable conditions. Coke is the easiest way out of the difficulty for those engines that come into the city only at the end of trips, as but a small amount is required to reduce the smoke to a bearable degree. But for suburban engines running principally in the city, coke will be found considerably more expensive than bituminous coal, as it takes about the same weight of each for the same service and coke costs more per ton. Coke has one advantage, however, and that is, it can be used on any grate and by any fireman with a little experience. No changes are necessary in the engines to burn coke where Illinois soft coal has been burned with success.

The time is now approaching when the Society for the Prevention of Smoke (an organization formed by the citizens for the purpose of suppressing the smoke-nuisance) has promised to prosecute relentlesaly those who still persist in defacing the city with black clouds. The date for the commencement of action is set at Sept. 1., and then will commence a fight, the end of which it is impossible to even guess at, as the politicians are taking a hand in the row.

The Chicago, Milwaukee & St. Paul Compound Locomotive Tests.

In the *Railroad Gazette* of July 1 appeared a condensation of the report of the Committee on Compound Locomotives appointed by the American Railway Master Mechanics' Association in 1891. The report gave results of many tests made by Mr. George Gibbs, Mechanical Engineer of the Chicago, Milwaukee & St. Paul, with two engines, one a Vauclain compound, the other of identical design except that the cylinders were for single expansion instead of double. While the tables given in the report are very complete, yet it is difficult to draw definite conclusions from them owing to the large amount of data. In order to show clearly what has been determined by these very accurate tests, we have plotted some of the results on the diagrams given with this.

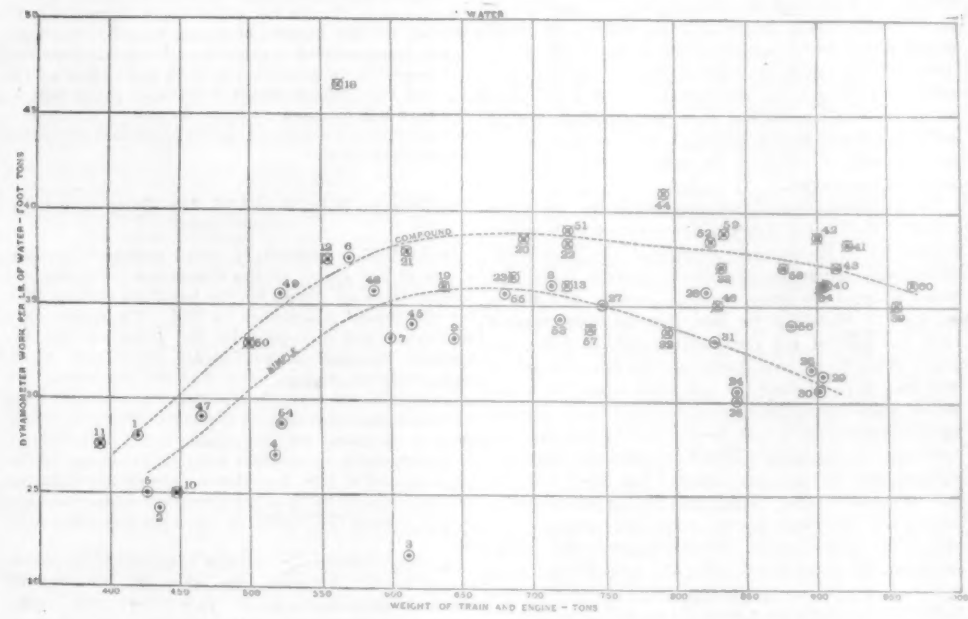
Diagram *A* shows the average evaporation per pound of coal for the different trips, arranged according to the total dynamometer work. This shows that there was no marked coincidence of variation in evaporation of water per pound of coal corresponding to variations in the total dynamometer work. The upper points on this diagram are those for the evaporation by Pittsburgh coal; the lower ones show the evaporation by Braceville coal. The numbers placed beside the plotted points designate the different trips made with the locomotives, and corresponding numbers on the different diagrams refer to the same trip. It is evident from this that an increase in dynamometer work done per trip is not necessarily followed by a corresponding change in the evaporation of water per pound of coal—that is to say, the efficiency of the boiler does not appear to depend strictly upon the total amount of dynamometer work per trip.

But diagram *B* shows what the evaporation does depend upon. That diagram gives the variation in the average amount of water evaporated per pound of coal arranged according to the average coal burned per square foot of grate surface per hour during the trip. This diagram is very instructive, as it shows clearly a marked decrease in evaporation of water, accompanying an increase in the amount of coal burned per square foot of grate surface per hour. As before, the upper points on the diagram relate to Pittsburgh coal and the lower to Braceville coal. The points indicate a distinct variation of evaporation accompanying a variation in the rate of coal consumption, and there is an arbitrary line drawn on the diagram through the midst of the points for Braceville and Pittsburgh coal, which indicates to some extent the variation of evaporation corresponding to the variation in the rate of coal consumption. It will be noticed that the extension of these lines crosses the vertical line corresponding to 15 lbs. of coal per square foot of grate surface per hour at 11 lbs. for Pittsburgh coal and at 10 lbs. for Braceville. Curiously, these points of crossing correspond nearly to the highest attainable evaporation of the two kinds of coal under the best conditions, as shown by stationary boiler tests. As this diagram indicates clearly a marked decrease in the

TABLE R.

Line No.	Engine.	Train.	Wind, direction.	Velocity, miles per hour.		Time on road.	Time for stops.	Actual time running.	Speed.	Dyna. work, million foot-tons.	Actual coal-lbs.	Dyna. work per lb. of coal.	Differences.	Per ct. of gain for compound.	Equated coal on basis of 6.7 lbs. of water per lb. of coal.	Dyna. work per lb. of coal.	Differences.	Per cent. of gain, equated coal.
27	Compound	Ex....	Head quarter.	12	Heavy train, good speed, very few stops	3.30	.22	3.08	29.20	1.644	7.290	230	..		7,094	232	2	
55	Simple....	Stock..	Head.....	13	" " high "	4.40	1.37	3.13	28.42	1.612	5,809	258	28		6,998	230	....	+ 0.87
32	Compound	" ..	Head quarter.	6	" " "	5.00	1.21	3.39	25.07	1.570	5,982	265			7,134	223	....	
53	Simple....	" ..	" "	11	" " good " bad rail	4.51	1.06	3.45	24.40	1.502	5,603	267	2		6,656	226	3	— 1.33
32	Compound	" ..	" "	6	" " high "	5.00	1.21	3.39	25.07	1.570	5,892	275	57		7,132	223	16	
26	Simple....	T. T. F.	Rear.....	10	" " " "	4.52	1.08	3.44	24.51	1.538	7,365	208	..	+ 27.4	7,416	207	....	+ 7.72
32	Compound	Stock..	Head quarter.	6	" " " "	5.00	1.21	3.39	25.07	1.570	5,982	265	61		7,132	223	21	
24	Simple....	" ..	Head.....	20	" " very short stops	4.54	.45	4.09	22.05	1 485	7,230	204	..	+ 29.9	7,381	202	....	+ 10.42
32	Compound	" ..	Head quarter.	6	" " high speed	5.00	1.21	3.39	25.07	1.570	5,982	265	..		7,132	223	....	
55	Simple....	" ..	Head.....	13	" " " "	4.40	1.37	3.13	28.42	1.602	5,869	275	10		6,908	230	7	— 3.05
32	Compound	" ..	Head quarter.	6	" " " "	5.00	1.21	3.39	25.07	1.570	5,982	265	77		7,132	223	23	
25	Simple	T. T. F.	Side.....	10	" " good conditions	5.01	1.02	3.59	23.09	1.526	8,167	188	..	+ 40.95	7,680	200	....	+ 11.50
41	Compound	"	Rear.....	3	Very long train, good conditions	5.10	1.18	3.52	23.67	1.726	7,058	245	31		6,942	249	18	
6	Simple....	"	"	8	Average train, average number stops, high speed	5.08	1.29	3.39	25.17	1.702	7,917	214	..	+ 14 5	6,888	231	....	+ 7.82
33	Compound	"	Head quarter.	7	Heavy train, average conditions, bad rail	5.22	1.26	3.56	23.28	1.711	7,345	232	18		7,104	242	11	
6	Simple....	"	Rear.....	8	Average train, average number stops, high speed	5.08	1.29	3.39	25.17	1.702	7,917	214	..	+ 8.41	6,868	231	....	+ 4.8
41	Compound	"	"	3	Very long train, good conditions	5.10	1.18	3.52	23 67	1.726	7,058	245	33		6,942	249	27	
28	Simple....	"	"	Light.	Heavy train, good speed, few stops, good conditions	5.01	1.17	3.44	24.62	1.715	8,040	212	..	+ 15.6	7,344	222	....	+ 12.20
18	Compound	L. T. F.	.....	.....	Light train, easy run, high speed	5.15	2.06	3.14	28.30	1.580	3,884	296	79		5,199	305	104	
25	Simple....	T. T. F.	Side.....	10	Heavy train, good conditions	5.01	1.02	3.59	23.09	1.526	8,167	187	..	+ 42.2	7,680	201	....	+ 52.8
39	Compound	T. F...	Head quarter.	3	Very heavy train, good speed, average conditions	5.25	1.43	3.43	24.60	1.637	6,565	247	..		7,084	232	....	
48	Simple....	.....	" "	3	Average train and speed, few stops, favorable conditions	5.37	1.32	4.05	22.43	1.683	5,503	302	55		7,200	236	4	— 1.69
19	Compound	T. T. F.	Side.....	2	" " bad rail	5.37	1.29	4 08	22.15	1.655	7,016	235	..		7,037	234	....	
48	Simple....	.....	Head quarter.	3	" " and speed, few stops, favorable conditions	5.37	1.32	4.05	22.43	1.683	5,562	302	67		7,200	236	2	— 0.85
20	Compound	T. F...	Rear.....	2	" " good run	5.25	1.22	4 04	22.48	1.688	6,380	264	..		6.760	250	13	
49	Simple....	.....	" "	4	" " and conditions	5.38	1.26	4.12	21.78	1.700	5,230	325	61		7.322	237	....	+ 5.48
52	Compound	.....	" "	1	Heavy train, good speed, average conditions	6.11	2.30	3.41	24.84	1.801	5,91	307	27		7,366	247	24	
56	Simple....	T. F....	" "	6	Very long train, many stops, good conditions	6 17	2 23	3.54	23.46	1.765	6,302	280	..	+ 9.53	7,901	223	....	+ 10.75
13	Compound	" ..	"	7	Heavy train, high speed, bad rail, lost time on sidings	6.40	3.07	3.30	25.37	1.731	7,542	229	..		7.362	236	13	
56	Simple....	"	Rear quarter.	6	Very long train, many stops, good conditions	6.17	2.23	3.54	23.46	1.765	6,302	280	51		7,91	223	....	+ 5.17
														Average per cent.....				10.44

NOTE.—Ex. denotes Extra. T. F., Through Freight. T. T. F., Through Time Freight. L. T. F., Local Time Freight. *The results of actual coal used are non-comparable as differen kinds of coal, viz.: Pittsburgh and Braceville were used.



No. 1.

per pound of coal is not entirely in favor of the compound engine. In fact, the points on the diagram are so uniformly distributed that it is difficult to say whether the simple or compound engine evaporated the most water to a pound of coal. Therefore, for the sake of determining the variation in the coal used for varying amounts of work done, we have taken an evaporation of $6\frac{7}{10}$ lbs. of water per pound of coal as a standard, for the purpose of analysis, and have reduced the coal consumption for the different trips to the amount that would have been used if the evaporation per pound of coal had been $6\frac{7}{10}$. These results are given in diagram *D*, which is interesting, as it shows how much more uniform is the coal used per million foot tons of dynamometer work when the evaporation is a constant. On this diagram two lines are drawn. The lower line represents the variation in the equated coal used per trip for different amounts of work done on a uniform basis of $6\frac{7}{10}$ lbs. of water per pound of coal. It is to be noticed that for 1,000,000 foot tons the coal used was 5,500 lbs., and for 2,000,000 tons only 8,500 lbs.; that is, while there was twice the work done, there was nothing like twice the amount of coal used. This brings forcibly to mind a fact that must be appreciated before a safe comparison can be made of the performances of two engines with different loads under conditions identical in every other respect. An examination of records of locomotive tests with the same engine shows that the larger loads are always hauled with comparatively better economy, sometimes even to a point where the load is increased until the engine is somewhat overcrowded. It is reasonable that this should be so because of the evaporation accompanying an increase in the rate of coal consumption, it would appear that the rate of evaporation is more dependent upon the rate of coal consumption than it is upon either the weight of the train or the work done per trip. This indicated conclusion corresponds to the results obtained in stationary boiler tests.

There is one disputed point about locomotive tests that is practically settled by the results we are examining. It is customary in some cases to compare locomotives on a ton mile basis, assuming that the work required to haul a ton one mile on the same piece of track, but in different kinds of cars and with different amounts of load per car is the same. Now, diagram *C* shows clearly that in some cases it requires very much greater power to haul a ton one mile than in other cases. This diagram shows the dynamometer work recorded on the different trips arranged according to the total ton miles. The lack of coincidence between the variation in ton miles and the variation in dynamometer work shows clearly what an unfair and unscientific basis a ton mile basis is for the comparison of the performance of locomotives unless the conditions of loading, lubrication, and the number of cars per train are identical. For instance, it would appear from the diagram that the dynamometer shows as much work done in hauling freight 50,000 ton miles, under one set of conditions, as for 80,000 ton miles under another set of conditions. In nearly all the cases of wide variations shown by the diagram *C*, the difference can be explained by examining the proportion of empty to loaded cars and the direction of the wind. A comparatively small number of ton miles gives a comparatively large amount of dynamometer work when there is a large proportion of empty cars, and a side wind adds materially to the dynamometer work recorded.

It will be seen from diagram *B* that the evaporation

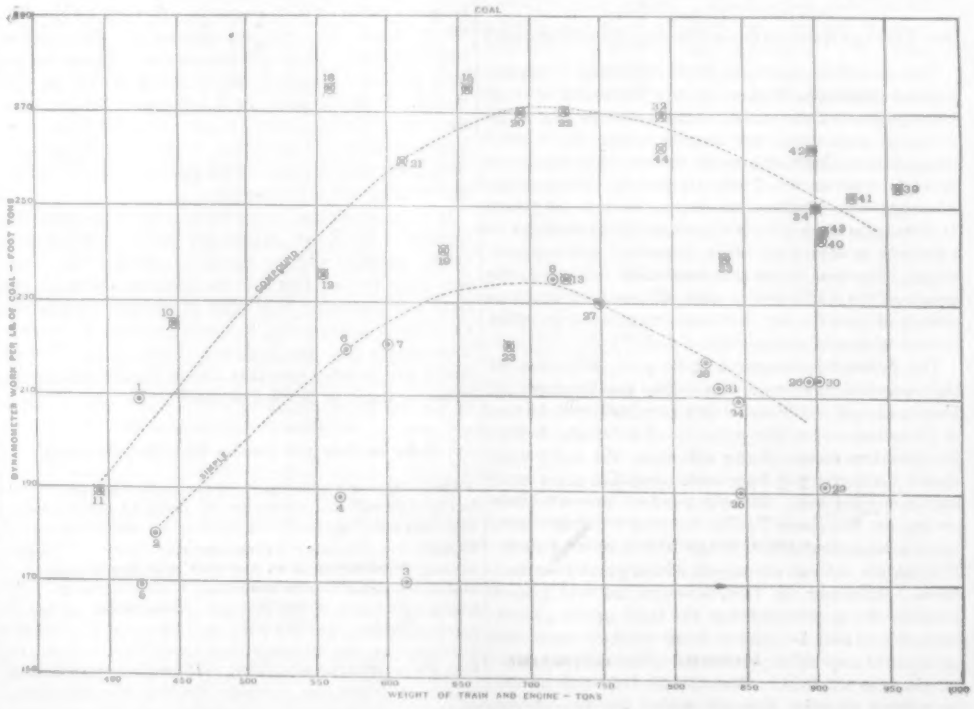
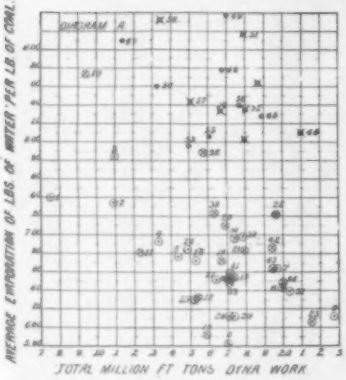
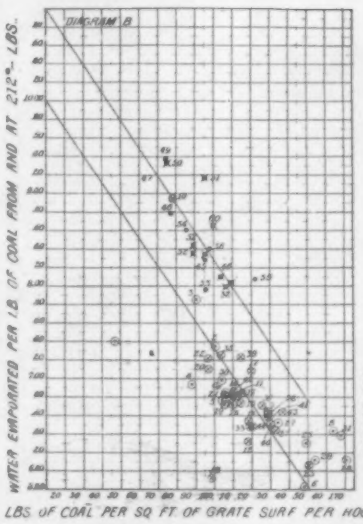
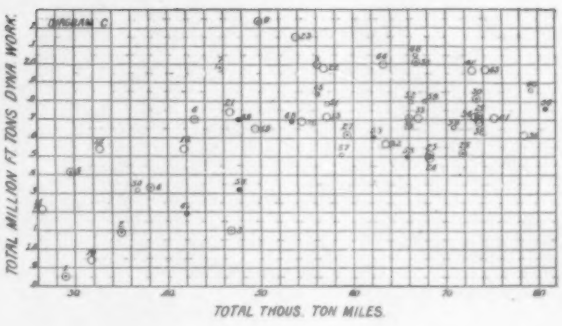


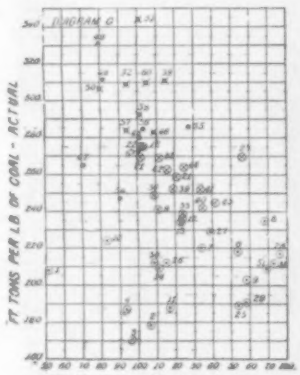
Fig. 2.

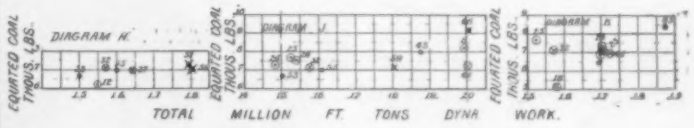
DIAGRAMS WITH C., M. & ST. P. LOCOMOTIVE TESTS

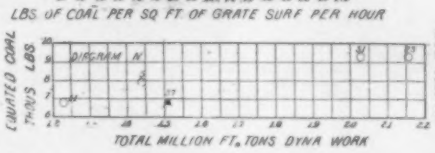


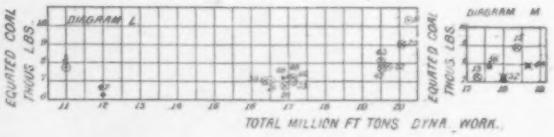


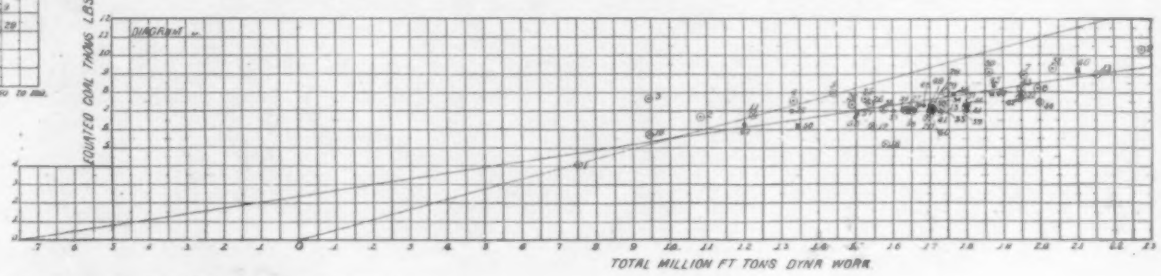


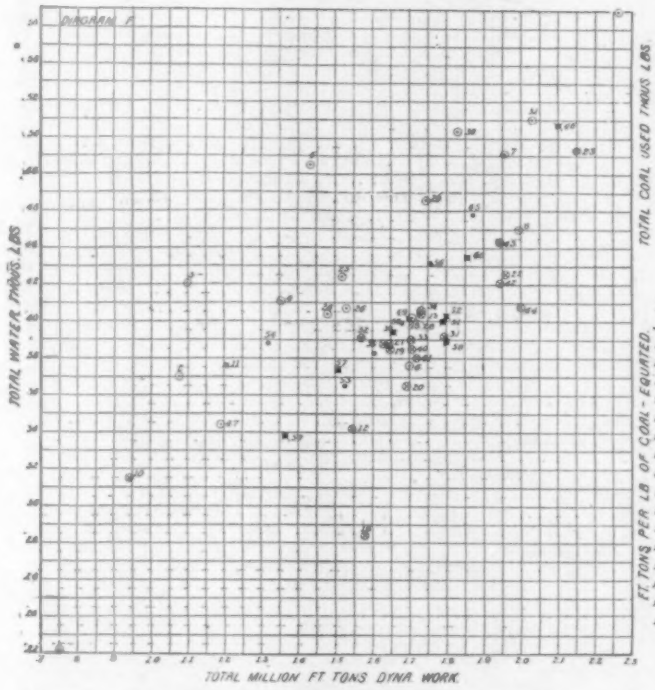


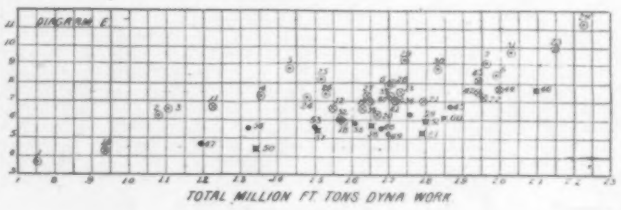


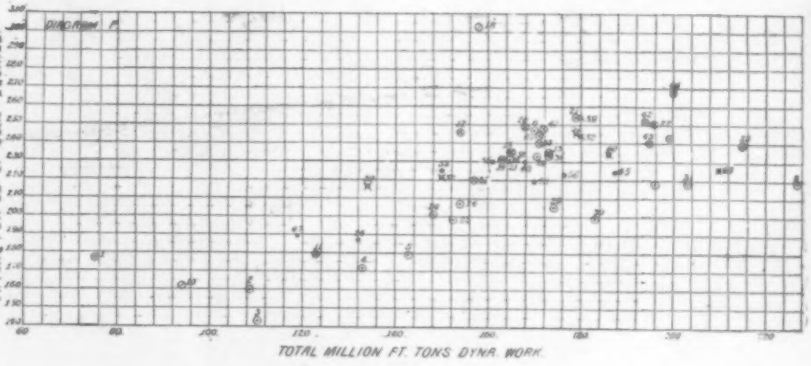


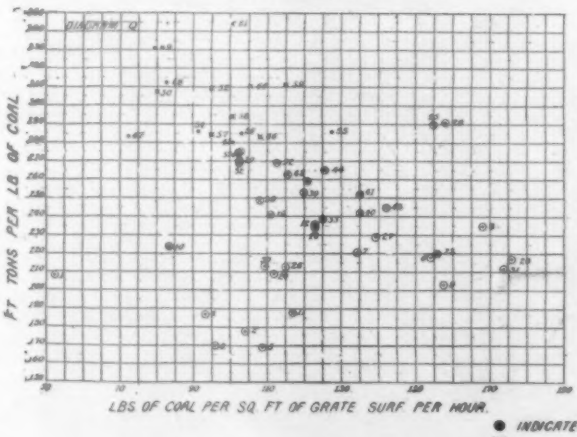


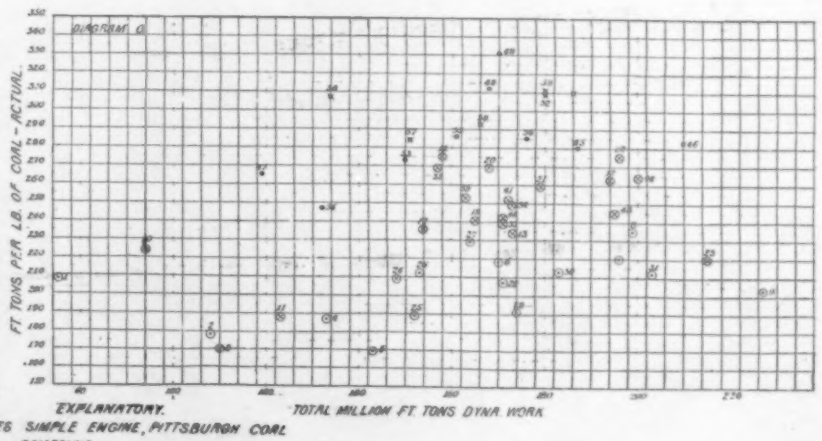












EXPLANATORY.

● INDICATES SIMPLE ENGINE, PITTSBURGH COAL
⊠ . . COMPOUND . . . . .
⊙ . . SIMPLE . . BRACEVILLE . .
⊗ . . COMPOUND . . . . .

DIAGRAMS TO ACCOMPANY THE DISCUSSION OF THE CHICAGO, MILWAUKEE & ST. PAUL LOCOMOTIVE TESTS.

Fteley estimated the cost of the new dam at $4,574,820, $1,047,180 above the lowest bid. The sub-committee, to which the bids were referred for examination, explained that it would be injudicious to award the contract to the lowest bidder. The Ryan & McDonald Construction Co., it is reported, was a limited corporation organized in Virginia last year, with a capital stock of $400,000, the individual members not assuming any liability.

Sault Ste. Marie Canal Business.

The annual statement of the Sault Canal for the fiscal year ending June 30, shows that the number of vessels passing through the canal into and out of Lake Superior was 11,557, an increase of 2,027 over 1891, the previously largest year. Freight tonnage was 10,000,000 tons, an increase of 17.5 per cent. over the year before recorded.

THE SCRAP HEAP.

Notes.

The Atchison, Topeka & Santa Fe has given notice that it will collect a demurrage charge of $2 a day on freight which it has held over 48 hours.

The American Express Co. will again operate over the Milwaukee, Lake Shore & Western after Sept. 15, when the five year contract of the United States Express Co. expires.

Preparations are being made by the Northern Pacific for relining the Mullan tunnel with brick arches and stone walls. This tunnel is seven-tenths of a mile in length.

On the afternoon of July 31 the blacksmith shop of the Great Northern shop plant at St. Paul was partially burned. The damage amounted to $15,000, and the work of rebuilding was begun on the following day.

The warehouse of the Atlantic City road (Philadelphia & Reading) at Camden, N. J., was burned July 27. The loss is estimated at between $10,000 and $15,000. The fire is supposed to have been caused by spontaneous combustion.

A new hospital is being built by the Northern Pacific at Missoula, Mont., to replace the one burned last spring. The new building will be constructed of brick, and will be in every way complete. It will cost between $25,000 and $30,000.

The new double-deck, screw propelled ferryboat "Washington" for the Pennsylvania service between Jersey City and New York made its trial trip this week. The boat is similar to the "Cincinnati," which was fully described in the *Railroad Gazette*, Nov. 6, 1891.

It is announced that the Burlington will change the day train on the St. Louis and Denver route to shorten the time to Denver. The Kansas City connection will be abandoned, the trains running through St. Joseph to Denver. The west-bound train will leave St. Louis at 1:14 p. m., and the east-bound train will arrive in St. Louis at 1:15.

The running time from Syracuse to Rochester was again lowered the other day by Vice-President Webb's special train. The distance, 81 miles, was made in 72 minutes. This is two minutes less than the Empire Express' fast time made July 4. The special consisted of Mr. Webb's private car and a day car. It left Syracuse at 5:52 p. m. and arrived in Rochester at 7:04 p. m.

The Adams Express Company was replaced on the St. Louis & San Francisco on Aug. 1 by Wells, Fargo & Co., which operates over all the other lines of the Atchison, Topeka & Sante Fe. The firm secures about 200 additional offices on about 1,600 miles of road and a direct line from Chicago to St. Louis and a large new territory in the southwest. The property of the Adams Express Co. was be transferred to Wells, Fargo & Co. at an appraised valuation.

World's Fair Notes.

Machinery Hall is doing well; the ironwork is all done except the dome; the roof is finished from the north and central transepts.

The Manufacturers Building, where construction interest has been centred for some time, is advancing rapidly. The iron workers are putting in the gable trusses on the south end, and the completion of their work is but a matter of a few days.

Twelve thousand carloads of material have gone into the buildings at Jackson Park. The force of laborers now handling the material numbers 8,000. Just now building is receiving the least attention. The grounds swarm with men laying electrical conduits, water, gas, and sewer pipes, making flower beds, and dredging lagoons.

The southwest corner of the grounds is full of activity preparing for the terminal railroads. The ground has been graded; everything is prepared for the raising of the superstructure of the intramural railroad. The superstructure for the sliding railroad is erected for a distance of about two blocks.

The General Electric Co. will have a most interesting exhibit on top of the electricity building. It will be a flash of lightning with a spark 35 ft. long. Two discharge points will be arranged on the very top of the building 35 ft. apart vertically. These discharge points will be connected to the opposite ends of a series of condensers and induction coils, so arranged as to increase the electric pressure from that of an ordinary dynamo to a pressure that will approximate to that of lightning. The discharge will be accompanied by a noise not unlike thunder, and will certainly scare a good many people and attract much attention.

Spanish-American Notes.

Work has commenced upon the railroad from Alagoinhas, state of Bahia, to the port of Piranhas, state of Alagoas.

Surveys are in progress for the extension of the Central Bahia Railroad, Brazil, to the towns of Lencoes and Andarahy.

Messrs. Pelleschi & Co. are about to commence construction upon a railroad from Rufino to Bahia Blanca, Argentine.

The Lower São Francisco Steam Navigation Co., Brazil, has been absorbed by the Companhia de Navegação Pernambucana.

Large coffee elevators are to be erected at Santos, Brazil, which it is hoped will help to relieve the block which usually occurs at that port during the coffee shipping season. The work is in the hands of Messrs. de Morgan, Snell & Co.

Work on the channel from the sea into the Lagoa dos Patos, intended to afford a direct approach by vessels of large draft to the city of Porto Alegre, Brazil, has come to a standstill owing to legal difficulties between the contractors and the government.

The new harbor works at Santos, Brazil, will consist of quays aggregating a length of 2,600 metres, and several large warehouses. Before autumn 1,000 metres of the quays and their warehouses will be completed, and the whole work is expected to be finished by 1895.

The receipts of the seven principal Argentine railroads for the week ending June 18, upon 3,895 miles of track, amounted to $20,778, against $179,036 for the corresponding week last year, upon 3,159 miles of track. The increase of earnings is 51.25 per cent., but the improvement in exchange within the year has increased the currency 21.62 per cent., so that taking into account the 23.30 per cent. increase of mileage, the increase in receipts attributable to growth of traffic is 5 per cent. The restoration of confidence upon the settlement of political difficulties has caused a stronger movement of agricultural produce toward the seaboard.

The Argentine Minister of the Interior in his message to Congress on railroads, gives some figures showing the singular disproportion between incomes and operating expenses on guaranteed and non-guaranteed lines. He cites the Argentine Great Western, with 319 miles of road, a capital of $10,331,479, a gross revenue for 1891 of $2,605,964, and expenses amounting to $2,380,159, leaving a profit of $225,804. The Central Córdoba line, 549 miles long, capital $21,000,000, earned $2,124,897, and spent $2,174,644. The Buenos Aires & Pacific, 429 miles long, capital $13,811,415, earned $2,898,861, and spent $2,436,325. Of the non-guaranteed lines the Central Argentine, 714 miles in length, with a capital of $50,688,407, earned $2,014,245, and spent only $1,659,383. The Buenos Aires & Rosario, with 905 miles of track, and a capital of $42,246,915, earned $9,203,878, and expended $5,259,788; and the Great Southern Railway, 724 miles long, capital $57,960,000, earned $4,898,308, and spent $2,382,335.

Labor Troubles.

The Grievance Committee of the Order of Railway Conductors is in session at St. Louis, and the outcome is believed to be a movement in favor of Federation.

The Grievance Committee representing the telegraph operators of the Union Pacific is in daily session at Omaha, but has failed to make an agreement for an advance in wages.

About 200 section men on the Central New England & Western went on strike this week on account of a reduction in their wages of 2½ cents an hour, or 25 cents a day. The pay has heretofore been $1.50 a day.

An agreement between the officials of the Chicago, Burlington & Quincy and representatives of the employés of the road, by the terms of which a substantial general raise in the wages of the employés was granted, went into effect Aug. 1.

A meeting of delegates representing the Brotherhoods of Locomotive Engineers, Firemen, Conductors, Brakemen, Switchmen and Telegraph Operators was held at Wilkes Barre, Pa., Sunday. A secret meeting was held in the morning and a mass meeting in the afternoon which 5,000 people attended.

The Louisville, New Albany & Chicago has signed a new agreement making a general raise in the pay of its telegraph operators. The minimum salary is to be $45 a month. Operators receiving over $45 and below $75 are raised $10 a month. Train dispatchers are raised from $85 and $90 to $105, while the chief dispatchers will receive $115. The operators will also receive extra compensation for overtime. The Louisville & Nashville road has also signed a similar agreement.

The dispatchers and telegraph operators on the Northern Pacific have asked for an increase of pay, claiming that the operators and dispatchers on both the Union and Southern Pacific systems are paid more than those of the Northern Pacific. The dispatchers will ask for $125 per month, where they now receive $110; also that the salaries of the chief and assistant chief be increased from $125 to $150. The operators will ask for an increase amounting to about 10 per cent.

Topics for the Coming International Railroad Congress.

At the forthcoming international railroad congress, to be held at St. Petersburg from Aug. 20 until Sept. 3, the following topics for discussion are to be presented among others: Frogs and switches; maintenance of way; limits of wear for wheel tires and rails; permanent way for fast trains; regulation of train speeds; fracture and wear of steel rails; maintenance of way with wooden and metal ties; durability of wooden ties, and means for their preservation; steam raising in locomotive boilers; high steam pressures and compounding; valve gears; equipment of roads with light traffic; continuous heating systems for trains; locomotive coal and oil consumption; locomotive boilers and boiler tubes, wheel tires and fireboxes; compound locomotives; car-axle lubrication; signals and block systems; distribution of empty freight cars; interchange of rolling stock; freight management at way stations; operating roads having light traffic; efficient use of stations, and passenger and freight cars; railroads in new countries; international railroad traffic; continuous transportation on roads of different gauges; distribution of costs for stations and line used in common by several roads; passenger and freight traffic, and rates; carrying capacity of freight cars; pensions for employés; railroad company management of hotels and restaurants; operating expenses; electric and other means of propulsion; and the management of branch roads.

Launches.

The transfer sidewheel steamer "Carrier" was launched from Marvel's shipyard, at Newburg, N. Y., July 30. It is intended for transferring cars of the Southern Pacific from New Orleans to Algiers, La. The hull is of steel, 296 ft. over all, 44 ft. beam and 72 ft. over guards. The hold is 10 ft. 2 in. deep.

The "Soo" line has launched the first of a fleet of steamers to compete for traffic on the great lakes. It is called the "Washburn" and is of the "whaleback" type, 320 ft. long over all, with triple expansion engines.

New Terminals at Cincinnati.

The Baltimore & Ohio Southwestern Terminal Co., of which Gen. Orland Smith, Vice-President of the Baltimore & Ohio, is President, is preparing to build extensive terminals in Cincinnati for the use of the Baltimore & Ohio Southwestern road. The company has been gradually acquiring property in and around Cincinnati, and having secured about all that is necessary to carry out its plans, it will at once proceed with the contemplated improvements. These will include freight-houses, freightyards, round-houses and car shops. An extensive tract of land has been secured just outside of Cincinnati for a freight yard and repair shops. The company has also bought a desirable tract almost in the centre of the city, which is now being filled up and graded and upon which commodious freight-houses will be erected. In addition to the improvements at Cincinnati the Terminal company will also build car shops and round-houses in Chillicothe, O. These will cost about $250,000. The town has subscribed $85,000 of this sum.

St. Louis Union Station Building.

The second contract for the construction of the end house to the new Union Station at St. Louis, to be built by the Terminal Railroad Association, was let July 30. There were 11 bids presented to the committee, running from $449,000 to $595,913. The bidders were from St. Louis, Chicago, Cleveland and Leavenworth. The lowest bid of $449,000, being the one submitted by Adams, Ridpath & Chandler, was accepted by the committee. The firm of the successful bidders is a new one, and the members are J. Willard Adams, formerly an architect in Topeka, Kan.; R. J. Ridpath, an old contractor, from Kansas City, Mo., and Samuel Chandler, proprietor of the White River (Bedford) quarries. This new contract does not include the heating, plumbing, cabinet work, marble, mosaic and decorating work, which will be contracted for within the next two months. The building will be of stone on the entire front on Market street and Eighteenth street. The rear and west elevations will be faced with a gray brick matching the color of the Bedford stone which will be used in front. The two lower stories of the building are fireproof and the two office floors are designed in mill construction. The heating plant is located under the baggage house about 200 ft. away, and the elevators and fans in the end house will have electric motors. Work on the foundation contract is now fairly started and the present contract calls for completion of the building within 18 months from the date of contract. The trainsheds, however, will be completed before that time and arrangements have been made to use part of the end house temporarily during the busy season next year. The finished plans do not vary essentially from those published in our columns shortly after the architectural competition. Mr. Theodore C. Link, whose plans were accepted, has been officially appointed Superintendent of the work.

LOCOMOTIVE BUILDING.

The Brainerd & Northern Minnesota has ordered two freight moguls from the Baldwin Locomotive Works.

The Minneapolis & St. Louis has received from the Rhode Island Locomotive Works two compound passenger locomotives.

CAR BUILDING.

The Minneapolis Street Railway has ordered 20 vestibuled electric cars from the American Car Co., of St. Louis. These cars are 41 ft. in length and will be used on the Interurban line, between St. Paul and Minneapolis, during the winter. It is understood that the Consolidated Car Heating Company's system of hot water heating will be employed in warming the cars.

The New York, New Haven & Hartford has recently let orders for 76 passenger cars, 20 of these being vestibuled drawing room cars. Osgood Bradley & Sons, of Springfield, Mass., have the contract for 50 standard day cars, which will cost about $5,000 each and also for six cars, costing about $7,000 each, for the "Gilt Edge" trains running between New York and Boston. The drawing room cars are being built by the Barney & Smith Car Co., of Dayton, O., and will cost about $12,000 each. The cars are to be equipped with all modern improvements as used on the road, but no special novelties will be introduced.

BRIDGE BUILDING.

Bergen County, N. J.—A proposition that the Bergen County Freeholders appropriate $5,000 toward building a bridge across the Passaic River was defeated last week by a tie vote, but may soon be revived. The Passaic Park Co. proposes to bridge the river at a cost of $24,000 and ask Bergen and Passaic counties to appropriate $5,000 each.

Bobcaygeon, Ont.—The representatives of Peterborough and Victoria counties have let the contract for building an iron bridge at Bobcaygeon to the Peterborough Bridge Co., and work on the structure will commence at once.

Boston.—The bids for constructing the draw in the L street bridge were opened this week and were as follows: King Bridge Co., Cleveland, O., $9,970; Boston Bridge Works, $10,331; Springfield Bridge Works, $10,487.

Cambellford, Ont.—The bridge at the Narrows is reported to be in a dangerous condition and active steps are being taken to secure the construction of a new bridge at this point. The estimated cost of a steel bridge is $20,000.

Chester County, Pa.—The County Commissioners have arranged for the building of a county bridge in East Bradford, over Valley Creek.

Work on the Pennsylvania Railroad bridge at Downingtown will be completed in October.

Chicago.—The Chicago & Northwestern has informed the Commissioners of Public Works that it will build a viaduct over its tracks at the Rush and Kenzil street crossing, provided the city will indemnify the company for damages to abutting property holders, and the commissioner has refused to agree to this condition. General Manager Whitman has agreed to rebuild North Clark street viaduct at the company's expense, according to plans already submitted. The causeway will cost $12,345.

The Halstead Street Bridge at Chicago will probably be built at once without further change in the plans, which propose a structure to cost $150,000. The Drainage Board propose to widen the river about 250 ft. below Sixteenth street and suggested that plans for the bridge provide for this enlargement, but the Commissioner of

Public Works has decided to go ahead with the work without further delay.

Cleveland, O.—Receiver J. K. Bole has asked for proposals for the construction of two new bridges, one at Sandyville and the other at North Industry, O.

Clinton, Tenn.—A four-span steel bridge will be built across the Clinch River at Clinton for the East Tennessee, Virginia & Georgia. Three of the spans are 151 ft. each, and one 102 ft. The Union Bridge Co. has the contract, and the cost will be $30,000.

Galt, Ont.—The sum of $10,000 has been voted by the ratepayers to build a new bridge and extend the water works.

Galveston, Tex.—The Secretary of War has approved the plans for the proposed bridge from the mainland to Galveston Island, and the Commissioners' Court of Galveston County, who have the work in charge, has directed the Missouri Valley Bridge & Iron Works, of Leavenworth, Kan., the contractors of the bridge, to begin work immediately.

Gananoque, Ont.—The Rathbun Lumber Co., of Kingston, has made a proposition to Gananoque to the effect that it will build an iron bridge across the mouth of the Gananoque River on condition that it receives the $14,000 granted by the Government and the town pay for approaches and filling in. The council will likely accept the offer.

Guelph, Ont.—Well's bridge has been condemned and it is probable the Board of Works will build a new stone or iron bridge at the centre branch of the river this year and renew the other bridges.

Indianapolis, Ind.—Bids will soon be asked for building an iron bridge over Pogue's Run, at Washington street. It will cost about $25,000.

Knowlton, Que.—J. E. Fay, Secretary-Treasurer, is receiving tenders for the construction of three iron bridges to be erected in this village.

Louisville, Ky.—A conference was held last week at Louisville between the local owners of the Jefferson bridge, across the Ohio River, which has been standing unfinished 18 months, and A. Bonzano, vice-president of the Phœnix Bridge Co., at which the Phœnix Company made a proposition to finish the work.

Milwaukee, Lake Shore & Western.—This company is erecting a three-span bridge, 345 ft. long, with one 180 ft. swing span at Sheboygan, Wis., and a two-span bridge, 180 ft. long, with a 130 ft. swing span, at New London, Wis. Contracts have also been let for four stone arch bridges of from 15 ft. to 20 ft. span, to replace trestle bridges between Bessemer, Mich., and Ashland, Wis.

Missoula, Mont.—Two spans of the new iron bridge across the river at Missoula are in place. The bridge has three spans, and is being built.

New Brunswick, Canada.—Mr. Haines, Bridge Inspector of the New Brunswick Government, states that the construction work on the bridge across the Petitcodiac River, at Moncton, will be finished in August. Mr. Haines is working on plans for two new bridges to be built across the Pollett River in Albert County. One bridge, to span the river Elgin, will be of iron with stone piers. The span will be 90 ft. in length. The second bridge will cross the river at Church's Corner.

Omaha, Neb.—The plans for the Fifteenth street viaduct have been completed. It will be 1,100 ft. long, with a 50-ft. roadway and two 8-ft. sidewalks, and will cost about $150,000.

Ottawa, Ont.—The city and county officials have held a conference with regard to the construction of a bridge across the Rideau River near Osgood street. The river at this point is about 300 ft. wide. The matter has taken no definite shape yet.

Philadelphia.—The Philadelphia Traction Co. has decided to replace the burned wooden bridges on Pulaski avenue, spanning the tracks of the Philadelphia & Reading by a new structure and the damaged iron bridge is also to be repaired

St. Cloud, Minn.—The falsework for the steel bridge which the Edge Moor Bridge Works are building across the Mississippi River for the Great Northern is in place, and work on the erection of the superstructure will be begun about Aug. 10.

St. Joseph, Mo.—City Engineer Fanning has the plans and specifications nearly completed for the viaduct across the railroad tracks at Sacramento street. It will have nine 60-ft. spans and two 45-ft. spans, and will be 20 ft. above the tracks. The roadway will be 18 ft. wide, and there will be two sidewalks.

Salem, Mass.—Proposals for building two stone piers at the Rocks bridge, over the Merrimac River, between Haverhill and West Newbury, will be received by the Essex County Commissioners in Salem until Aug. 8. Plans can be seen at the office of Charles A. Putnam, C. E., 251 Essex street, Salem.

Santa Barbara, Cal.—The Supervisors of the County of Santa Barbara will receive plans, specifications and bids until Aug. 22 for two bridges across the Santa Ynez River, one near the mouth of the river and one at the Mission Crossing.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Chicago & Alton, quarterly, $2 per share on the preferred and common stock, payable Sept. 1.

Old Colony, semi-annual, $1.75 per share, payable Sept. 1.

Rome, Watertown & Ogdensburg, semi-annual, ¼ per cent., payable Aug. 15.

St. Paul & Duluth, semi-annual, 3½ per cent. on the preferred stock, payable Sept. 1.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Boston, Hoosac Tunnel & Western, annual, Saratoga Springs, N. Y., Aug. 17, for the election of directors and to consider the consolidation with the Fitchburg.

Chicago, Milwaukee & St. Paul, annual, Milwaukee, Wis., Sept. 21.

Chicago & West Michigan, special, Grand Rapids, Mich., Aug. 16, to authorize the purchase of the Chicago & North Michigan.

Long Island Boynton Bicycle, annual, New York, N. Y., Aug. 5.

Toronto, Hamilton & Buffalo, special, Aug. 9.

Upper Coos, Lancaster, N. H., Aug. 16.

Troy, Saratoga & Northern, annual, Saratoga Springs, N. Y., Aug. 17.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *New England Railroad Club* holds regular meetings, at the United States Hotel, Beach street, Boston, Mass., on the second Monday of each alternate month, commencing January.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The *New York Railroad Club* holds regular meetings on the third Thursday in each month, at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, N. Y. The next meeting will be Sept. 15.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.

The *Northwest Railroad Club* meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station, at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m. in the directors' room of the St. Paul Union Station.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at the American House, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesday in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1,122 Girard street, Philadelphia, on the first and third Saturday of each month. The annual meeting is held on the third Saturday in January. The club stands adjourned during the months of July, August and September.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the South* holds its monthly meetings on the second Thursday at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Denver Society of Civil Engineers and Architects* holds regular meetings at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Association of Kansas* holds regular meetings at Wichita on the second Wednesday of each month at 7:30 p. m.

The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

The *Engineers' Club of Minneapolis* meets the first Thursday of each month in the Public Library Building, Minneapolis, Minn.

The *Canadian Society of Civil Engineers* holds regular meetings at its rooms, 112 Mansfield street, Montreal, P. Que., every alternate Thursday except during the months of June, July, August and September.

The *Association of Civil Engineers of Dallas* meets at 803 Commerce street, Dallas, Tex., on the first Friday of each month at 4 o'clock p. m.

The *Technical Society of the Pacific Coast* holds regular meetings at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., at 8 o'clock p. m. on the first Friday of each month.

The *Tacoma Society of Civil Engineers and Architects* holds regular meetings on the third Friday of each month, in its rooms, 201 and 202 Washington Building, Tacoma, Wash.

The *Engineers and Architects' Club of Louisville* holds regular meetings on the second Thursday of each month, at 8 o'clock p. m., at its rooms in the Norton Building, Louisville, Ky.

The *Association of Engineers of Virginia* holds regular meetings at Roanoke, on the second Saturday in each month, at 8 p. m., except the months of July and August.

New England Roadmasters' Association.

The tenth annual convention of the New England Roadmasters' Association is to be held at Cooley's Hotel, Springfield, Mass., Aug. 24 and 25. By vote of the Executive Committee, date of meeting was changed from 17th to 24th. The Convention will open at 1:30 p. m., Aug. 24. After the regular routine business, the following questions will be taken up for discussion: (1) Comparison of heavy rail sections now advocated for use with light rail sections; should there be an increase of labor to roadbed to get full life and value from use of the heavier rail? (2) Small culverts and cross drains; best material and form for same. (3) Fire damage; how to lessen the number of fires and best method of adjusting claims. (4) Is not the use of cheap and therefore inferior material and tools detrimental to the general economy of a road? (5) Review of previous year's questions. Committees appointed by the Executive Committee will submit reports upon these questions.

The Executive Committee has provided for a social time on the evening of the second closing day, and as it may be said to celebrate the tenth anniversary of the organization a full attendance is desired.

Supply firms are asked to send exhibits of interest to maintenance of way men, and a room has been hired in which the devices and appliances can be arranged for exhibition. During each session of the meeting the members will adjourn in a body to this room to meet the representatives of the supply firms and become acquainted with their devices.

F. C. Clark is President of the association, and G. L. R. French, Boston & Maine Railroad, Northampton, Mass., is Secretary.

PERSONAL.

—Mr. John T. Rich, who is Republican candidate for Governor of Michigan, was formerly State Railroad Commissioner, being appointed in 1887 to serve four years.

—Mr. Lucien Kennedy, a prominent railroad contractor, died at Lake Charles, La., July 25 last, from an abscess in his hip. He was a member of the firm which built the Kansas City, Watkins & Gulf road.

—Mr. Thomas Hassard, who has been for ten years engineer in the office of the United States Commissioner of Railroads, has resigned on account of his failing health. Mr. Hassard is 78 years of age and is suffering from heart trouble.

—On account of extended absence in Europe, Mr. Robert H. Coleman has resigned the presidency of the Cornwall & Lebanon road and Mr. Archibald Rogers has been elected to the vacancy and Mr. Henry T. Kendell has been elected Vice-President.

—Col. Cary A. Wilson, who was Chief Engineer of the Mobile & Birmingham during its construction, and later Chief Engineer of the East Tennessee, Virginia & Georgia, has been appointed Chief Engineer of Maintenance of Way of the Missouri, Kansas & Texas.

—Mr. J. C. Coney, who has been appointed Assistant Superintendent of the Seattle, Lake Shore & Eastern, has been for 11 years past in the service of the Chicago, St. Paul, Minneapolis & Omaha, and for the last three years has occupied the position of Secretary to the General Manager.

—Mr. S. D. Mason has been appointed Assistant Purchasing Agent of the Northern Pacific and Seattle, Lake Shore & Eastern roads. Mr. Mason has been connected with the engineering department of the Northern Pacific for over 12 years, and for several years past has occupied the position of Principal Assistant Engineer of the road.

—Mr. S. W. Huston, Master Mechanic of the Cornwall road, has been appointed Superintendent and Master Mechanic of the Chicago & South Side Rapid Transit road to succeed Mr. E. B. Wetmore, resigned. Mr. Huston has been Master Mechanic of the Cornwall road for about four years, and was formerly connected with the Pennsylvania, serving in both the mechanical and operating departments.

—Mr. I. A. Sweigard has been appointed General Manager of the Philadelphia & Reading, the appointment dating from Aug. 1. Since the election of Mr. A. A. McLeod to the presidency of the company upon the retirement of Mr. Austin Corbin in 1890, Mr. Sweigard has occupied the position of Assistant General Manager. He has been connected with the road since 1864, being made Division Superintendent in 1873 and General Superintendent in 1886.

—Mr. Louis Coste, C. E., has been appointed Chief Engineer of Public Works of the Dominion Government. He has discharged the duties of the position for about a year, and although but 38 years of age, has had a large experience in engineering, and has planned many important public works. He received his professional education in Europe, has been an Associate Member of the Institution of Civil Engineers (Great Britain) since 1883, and the Canadian Society of Civil Engineers.

Mr. James L. Frazier, who has been Superintendent of the Truckee Division of the Southern Pacific for some time, has been tranferred to the Fresno Division of the same road. Mr. Frazier was formerly Superintendent of the Western Division of the Newport News & Mississippi Valley Co., resigning in April, 1890, and he has been since connected with the Southern Pacific. Mr. Frazier has just arranged to remove his family from Kentucky to Fresno.

—Mr. M. T. Donovan, who has been appointed General Freight Agent of the Boston & Maine system, to fill the vacancy created by the recent advancement of Mr. W. F. Berry to be General Traffic Manager, began his railroad career 15 years ago in the general office of the Boston & Lowell road, and has risen steadily. For the past two years he has been assistant to the General Freight Agent, and for three years previous to that was connected with one of the fast freight lines operated by the Boston & Maine railroad. He was born in Concord, N. H., in 1857.

—Mr. Richard Relf, of St. Paul, Minn., has been appointed Engineer in the office of the United States Commissioner of Railroads, H. A. Taylor, succeeding Thomas Hassard, resigned. Mr. Relf is 58 years of age, and began railroading in the early fifties in the engineering department of the Missouri Pacific. Later he was connected with the engineering department of several roads, and in 1867 made the first instrumental survey for the Northern Pacific, from Lake Superior to Red River. Shortly after completing that survey Mr. Relf sustained an injury to his right knee, which has since incapacitated him for field work. Since 1870 Mr. Relf has been continuously in the service of the Northern Pacific, with the title of Assistant Engineer in the office of the Chief Engineer.

—Mr. James M. Sawyer, General Freight Agent of the Minneapolis, St. Paul & Sault Ste. Marie, died at his home in Minneapolis on July 28. His death was the result of a complication of ailments following an attack of la grippe. Mr. Sawyer began his railroad career with the Chicago & Northwestern at Dixon, Ill., and occupied various positions with that road, the Illinois Central, Buffalo, Rochester & Pittsburgh and New York, Lake Erie & Western until 1887, when he accepted service with the "Soo" line as general agent at Minneapolis. In March, 1888, he was appointed General Freight Agent of the St. Paul, Minneapolis & Manitoba, filling that position until the fall of 1890. In March, 1891, he again entered the service of the "Soo" line, with the title of General Freight Agent, and held that title at the time of his death, although he had been unable to attend to the duties of the office since February last. Mr. Sawyer was universally popular wherever he was known, and his quaint smile and droll remarks will long be remembered by his railroad friends.

ELECTIONS AND APPOINTMENTS.

Allegheny & Lawrence.—The following are the incorporators: George F. Oliver, Pittsburgh, President; A. W. Black, R. Finney, Jr., J. A. Smith, A. E. Anderson, C. D. Fraser and Henry R. Rea, all of Pittsburgh, Directors.

Andrew, Hurstville & Southwestern.—The incorporators are J. L. Gibson, J. H. Ottens, C. R. Bell, W. E. Hoyt, J. Y. Buchanan and R. F. McMeans, all of Andrew, Iowa. J. L. Gibson is President and J. H. Ottens Treasurer.

Boston & Albany (Georgia).—The following is a list of the officers of the company: J. N. Pidcock, President, White House, N. J.; M. R. Mallette, Vice-President, Boston, Ga.; C. W. Pidcock, Superintendent and Secretary, Round Lake, Ga., and Thos. McIntyre, Auditor.

Boston & Maine.—F. N. Chase has been appointed Assistant General Passenger Agent, vice C. E. Lord, resigned. A. C. Varnum, Chief Clerk of the General Passenger Agent, has been promoted to the position of New England agent, the position which has been filled by Mr. Chase for the past year.

Charleston, Cincinnati & Chicago (Tennessee).—This road having been sold to the Finance Company of Pennsylvania, Samuel Hunt has been appointed agent for the purchasers and General Manager, and J. J. Collier, Comptroller, with offices in Bullitt Building, Philadelphia, Pa. A. N. Molesworth is Chief Engineer, with headquarters at Johnson City, Tenn.

Cornwallis Valley.—The annual meeting of the company was held at Canning, N. S., last week. Messrs. Stephen Sheffield, R. M. Rand and W. E. Roscoe were re-elected directors for the current year.

Des Moines, Northern & Western.—C. W. Huntington has been appointed Assistant Superintendent of the company, with office at Des Moines, Ia.

East Louisiana.—J. M. Givens has been appointed Acting Superintendent, with headquarters at Florenville, La., vice S. R. Poitevent, resigned.

Florida Central & Peninsular.—John A. Henderson, General Counsel of this company, has been elected Vice-President. Mr. Henderson retains the position of General Counsel with office at Tallahassee, Fla.

Louisville, New Albany & Chicago.—J. O. Ewan has been appointed Assistant Superintendent of the first division, with headquarters at Monon, Ind.

Middlesex Valley.—The following are the officers of the company: President, Charles W. Drake, 32 Nassau street, New York; Vice-President, L. R. Bacon, New York, and Secretary and Treasurer, C. H. Wildes, New York.

Minneapolis, St. Paul & Sault Ste. Marie.—W. C. Stone has been appointed Assistant Secretary and Treasurer of this company, and also of the Duluth, South Shore & Atlantic.

Missouri, Kansas & Texas.—Cary A. Wilson has been appointed Chief Engineer in charge of maintenance of way and bridges and buildings, with office at Parsons, Kan.

Mobile & Ohio.—F. W. Birchett, formerly Freight Agent of the Mississippi Valley route at Memphis, has been appointed General Agent of this road in St. Louis, succeeding W. J. Jeffrey, resigned.

Montana Central.—At a meeting of the directors in Helena, Mont., last week, Samuel Hill, of St. Paul, was elected President; A. S. Shores, of Great Falls, Mont., Vice-President, and Edward Sawyer, Secretary and Treasurer.

Mousam.—At a meeting of the incorporators of the road, last week, Thomas Goodall, Geo. F. West, of Portland, Me., E. M. Goodall and L. B. Goodall were elected directors.

Northern Pacific.—The jurisdiction of E. H. McHenry, Principal Assistant Engineer, with headquarters at Tacoma, has been extended to Livingston, Mont. S. D. Mason has been appointed Assistant Purchasing Agent with headquarters at Tacoma, Wash.

Pecos Valley.—John G. Harris has been appointed Superintendent, with office at Pecos, Tex., vice W. H. Vaughan.

Pennsylvania, Lehigh & Eastern.—The company has been reorganized and new officers and directors were elected at a meeting in Philadelphia last week. David A. Easton, of New York, was elected President; W. J. Hilands, Cleveland, O., Vice-President, and S. H. Nichols, of Philadelphia, Secretary and Treasurer. The new board of directors comprises, besides the officers, Lawyer C. F. Matthewson, of New York; Banker Lawrence S. Mott, of New York; Lyddon Flick, of Wilkesbarre; Sidney L. Wright, of Philadelphia, and J. H. Park, of Wilkesbarre, Pa.

Philadelphia, Reading & New England.—The directors of the consolidated company are: A. A. McLeod, President; C. Tower, jr., W. W. Gibbs, John W. Brock, Charles Hartshorne, and Charles E. Morgan, jr., of Philadelphia; Arthur Brock, of Lebanon, Pa.; Joseph F. Sinnott, of Rosemont, Pa.; James Armstrong, J. H. Taylor, William W. Jenks, Maurice A. Viele and Pierson Brown, of New York city.

Pullman's Palace Car Co.—A. W. Sargent, Assistant Superintendent at Jersey City, has been appointed Division Superintendent, with headquarters at Jacksonville, Fla.

Raleigh & Augusta Air Line.—William Smith has been appointed Superintendent, vice T. W. Whisnant. His office is at Raleigh, N. C.

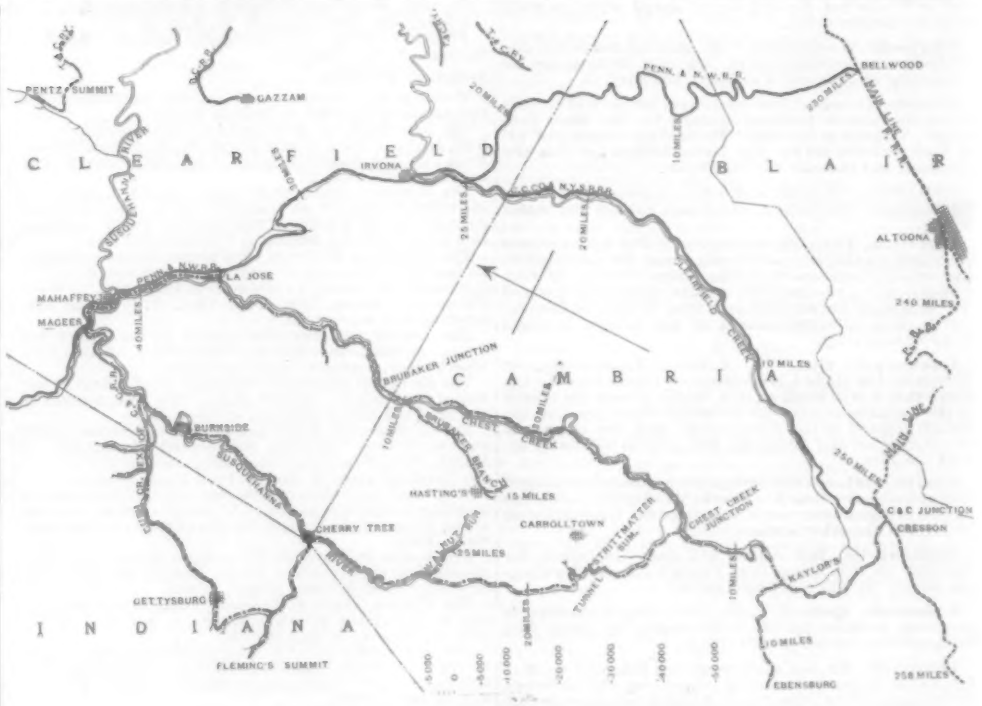
Rutland.—The annual meeting of the stockholders was held at Rutland, Vt., July 27. The old board of directors was elected, as follows: Percival W. Clements, George H. Ball, John W. Stewart, LeGrand B. Cannon, Horace G. Young, Chester Griswald, David Willcox, H. LeGrand Cannon and Frederic Cromwell.

Savannah, Americus & Montgomery.—H. B. Byrne, who has been General Agent of the Central of Georgia at New Orleans for several years, has been appointed General Eastern Agent of this road at New York.

Seattle, Lake Shore & Eastern.—S. D. Mason has been appointed Assistant Purchasing Agent, with headquarters at Tacoma, Wash. J. C. Coney has been appointed Assistant Superintendent, with headquarters at Seattle, Wash.

Southern Pacific.—James L. Frazier has been transferred to the Fresno Division, with headquarters at Fresno, Cal. He has been succeeded as Superintendent of the Truckee Division by J. H. Whiteed, formerly of the Fresno Division, whose headquarters will be at Wadsworth, Nev.

West Shore.—N. E. Clark has been appointed General Baggage Agent, to succeed George W. Clymans, deceased.



Cambria & Clearfield Railroad—Pennsylvania System.

RAILROAD CONSTRUCTION.

Incorporations, Surveys, Etc.

Allegheny & Lawrence.—This company was incorporated at Harrisburg July 29. The road is to extend from Bryant, Allegheny County, to Moravia, Lawrence County, Pa., about 50 miles. The capital stock is $1,500,000. George T. Oliver, Pittsburgh, is President.

Altamont & Manchester.—Five miles of grading has been completed from Altamont, Ky., and about 70 men are now working on the line. The road has been located from Altamont east toward Manchester, in Clay County, about 20 miles. C. Crooke, of Altamont, is President.

Andrew, Hurstville & Southwestern.—Chartered in Iowa to build a road from Andrew to Hurstville, Ia.

Boston & Albany (Georgia).—The road owned by the Quitman Lumber Co., which was being extended northwest toward Moultrie, Ga., has been leased to this company. The road has been completed for 15 miles north of Quitman and is now being extended toward Moultrie, 14 miles further north. The company also proposes to build about 12 miles of road from Quitman west to McDonald, to connect with the road already built from that point toward Round Lake. The new road is being built by the company and not by contract. C. W. Pitcock, of Round Lake, Ga., is Superintendent.

Bristol, Elizabethton & North Carolina.—The track laying which began a few months ago south of Bristol, Tenn., reached Elizabethton, N. C., on July 30, completing the road for a distance of 21 miles, of which 11 miles was built in July.

Buffalo & Geneva.—The tracklaying on the uncompleted section of the Geneva & Van Ettenville road between Burdett and Lodi, N. Y., was finished last week. The second track on the Buffalo & Geneva has been completed east of Buffalo as far as Batavia, and it is expected that this work will be completed in August and the entire line open for regular traffic on Sept. 1. The maximum grade on the road is about 21 ft. to the mile.

Burlington, Cedar Rapids & Northern.—The grading on the eastern division of the Estherville extension, between Forest City and Bancroft, Ia., on the Chicago & Northwestern, a distance of about 25 miles, is reported to be very nearly finished, and the sub-contractors are now pushing the work near Bancroft, and largely increasing the number of men at work.

Cambria & Clearfield.—The map published herewith shows the lines of the Cambria & Clearfield already built and surveyed and connecting roads. The dotted line represents a portion of the main line of the Pennsylvania, and at the top of the map the termini of three small branches of the Tyrone division of the Pennsylvania, also the Beech Creek road to Gazzam are shown. The solid black lines represent roads over which the Pennsylvania has no control. The Cambria & Clearfield is shown by the broken lines; the road already built by the short line and crosses and the line under construction or survey by the short line and dots. The portion of the road between Cresson and Ebensburg was formerly known as the Ebensburg & Cresson road and has been in operation for a number of years. The Ebensburg & Cresson has been merged into the Cambria & Clearfield, and the portion of the line between Cresson and Kaylor is being rebuilt, owing to heavy grades and excessive curvature. The Cush Creek Branch, from Mehaffey to Graham's Run, a distance of 7½ miles, and the Brubaker Branch, extending from La Jose to Hastings, a distance of 15.4 miles, were built about three years ago, and have since been in constant operation. The line from Brubaker Junction to Kaylor, a distance of about 10 miles, is known as the Chest Creek Division, and was completed about two months ago, and is now in operation. The line from Chest Creek Junction, via Garman's Mills and Cherry Tree to Fleming Summit, a distance of about 24 miles, is under construction, and now about two-thirds graded. The contractors are Charles McFadden, 735 Market street, Philadelphia, from Chest Creek Junction to Garman's Mills, including a branch up Walnut Run for a distance of about 1½ miles; Kellar & Crossan, Fox Chase, Philadelphia, from Garman's Mills to Cherry Tree; D. F. Keenan, 868 Perkiomen street, Philadelphia, from Cherry Tree to Fleming Summit. The line from Chest Creek Junction to Cherry Tree is known as the Susquehanna Division, and from Cherry Tree to Fleming Summit as the Indiana Division. Tracklaying has been commenced on the Susquehanna Division at Chest Creek Junction, and the end of track is now at Strittmatter Summit, about 3½ miles from Chest Creek Junction. The track is being laid by A. B. Cushing, of Minersville, Pa. The construction of the line from La Jose via Mehaffey, to Maghees, has just been begun, and the contractors are George S. Good & Co. and J. M. Campbell & Co. The general character of the work is quite heavy. There are a number of small girder bridges and one tunnel, 900 ft. long, on the Susquehanna Division at Strittmatter Summit. The maximum grade on the Susquehanna Division is two per cent., and the maximum curvature 10 deg. On the Indiana Division the maximum grade is 0.75 per cent, and heaviest curve nine degrees. Surveys have been made from a point on the Cush Creek Branch via Burnside to Cherry Tree to connect with the Susquehanna Division, and from the terminus of the Cush Creek Division via Gettysburg to connect with the Indiana Division. When these lines will be constructed is problematical. The Cambria & Clearfield is being constructed mainly for the purpose of opening up new fields of bituminous coal, it being estimated that within the loop formed by Chest Creek, Cush Creek and Susquehanna divisions there are 100,000,000 tons of bituminous coal. The traffic from the Cush Creek Branch, and from the Brubaker Branch before the Chest Creek Division was built, had to be hauled over the Bells Gap Railroad, (now Pennsylvania & Northwestern) from Mehaffey to Bellwood where it would again reach the Pennsylvania system. On the completion of the line from La Jose to Maghees the Pennsylvania will be entirely independent of foreign lines in transporting this traffic to its destination.

Canada Western.—A preliminary survey for this line is to be commenced this week by H. Croft, of Victoria, B. C., and a line will be surveyed to the north end of Vancouver Island and thence to the eastern boundary line of British Columbia. Frank Bakeman and F. P. Blackman & Co., who are said to represent the Chicago syndicate which has undertaken to make a preliminary survey of the route, visited Victoria last week and went over part of the line with R. P. Rithet, one of the local directors.

Centralia & Chester.—The extension northeast of Nashville has been completed to within two miles of the town of Hoyleton, Ill., about 10 miles, and the line will be opened to that point this week. Work is progressing on the balance of the extension to Centralia.

Chicago, Rock Island & Texas.—The right of way through Lincoln and East Lincoln, Neb., was finally secured last week for the new line to Jansen, Neb. The company has been endeavoring to secure the necessary property, which includes valuable land in the centre of the city for the last three months and has paid about $400,000 for the right of way. The location of the line between Lincoln and Jansen is being revised, as noted last week, and it is expected that the contract for the work in Lincoln will be let in a few days.

Chicago, St. Paul, Minneapolis & Omaha.—The company is making considerable improvements to its roadbed. Last year all the curves on the eastern division were ballasted with crushed stone, and this season the crusher has been continuously at work at Wilson, Wis. The road is replacing a number of small wooden bridges with steel structures, and the use of wooden culverts is rapidly being done away with, stone taking the place of wood in the larger ones and iron pipe being substituted for the lesser ones. Several of the grades on the eastern division have been reduced, and wherever it was possible the track has been straightened.

Columbia & Puget Sound.—The Oregon Improvement Co. has let the contract for clearing and grading the ex-

tension from Maple Valley, Wash., east to the Sherwood property, to Henry & Balch of Seattle. The line will be 8½ miles long, and will extend almost due east from Maple Valley to a point northeast of Black Diamond. About a mile of grading has already been done and will be repaired. Work is to begin immediately. The rails are already delivered.

Duluth, Pierre & Black Hills.—The company now has under contract 25 miles of the grading between Faulkton and Pierre, S. D., and the balance of the right of way is being secured. The entire distance between these two points, about 40 miles, will probably soon be under construction.

Eastern Central.—The engineers who begun the survey at Galion last spring completed the line to Millersburgh, O., about 60 miles last week, and are now surveying a route through that town. The survey may be continued east from Millersburgh toward Bowerstown, but this matter has not been decided.

Everett & Monte Cristo.—Tracklaying on the road was commenced at Hartford, Wash., which is the terminus of the line, July 26. The force will be increased largely in a short time, and work pushed with all possible speed. A cargo of 500 tons of rails has arrived from New York, and two other cargoes are on the way.

Florence, Cripple Creek & State Line.—We were misled by newspaper accounts into stating, the week before last, that the contract had been let to J. D. Orman & Co., of Pueblo, for building this road from Florence to Cripple Creek. The contract has not been let, but the officers now state that they expect to begin grading on the first 10 miles north of Florence, Col., before Sept. 1, and also to begin the 300 ft. bridge crossing the Arkansas River at Florence. They state a representative of a Philadelphia banking firm will make an inspection of the route this month and if his report is favorable the firm has agreed to negotiate $500,000 of the company's bonds.

Great Northern.—The tracklaying west of Spokane, Wash., is expected to be completed to the Columbia River this week. A transfer boat will carry construction material to the west side of the river while the bridge is being erected. The bridge will be about 400 ft. long, and will probably take 14 months to erect. The time for beginning through passenger traffic into Spokane, Wash., has been postponed to Aug. 14. The equipment is now ready and the service will be complete in every way, including through sleeping and dining cars on all trains. Although the roadbed is new, it is in excellent condition; 80-lb. rails have been used, and the extension has been ballasted with gravel throughout. One of the officers, speaking of the extension, says that "from St. Paul to within 185 miles of the summit of the mountains, the maximum grade is but 31 ft. to the mile, and for the rest of the distance it is only 52 ft. We have 310 miles in the Missouri district where the maximum grade does not exceed 21 ft. to the mile. In fact, our heaviest grade on the entire line is between the St. Paul Union Station and our shops out toward Como." The elevation of Pacific Junction is 2,517 ft., and there is a gradual ascent until at 182 miles miles west the summit is reached. It is the highest point on the line, and the elevation is 5,200 ft. At Pasco Pass, 209 miles from Pacific Junction, the road passes through a tunnel at an elevation of 4,131 ft., the elevation of the Peak at that point being 4,469 ft. There is a gradual descent westward from the summit to Kalispell, which has an elevation of 2,917 ft. Between Jennings and Bonner's Ferry the line follows the Kootenai River. It strikes the Pend d'Oreille near Sand Point and follows it to Newport. From Newport to Cordovia it parallels the Little Spokane, making a gradual descent to Spokane, the elevation of which is 1,876 ft. The location of the switchback at the Cascades is now in progress. It will be built on timbers from the mountains, as there is abundance of hemlock 3 to 4 ft. in diameter on the summit.

Huntingdon & Broad Top Mountain.—The Shreeves Run branch, upon which grading was recently begun, is to be 1¾ miles long and will extend from the Six Mile Run branch to undeveloped coal fields in the Broad Top region.

Iberia & Vermillion.—The route of this road, referred to last week, is from a point on the Salt Mine branch of Morgan's Louisiana & Texas road, six miles south of New Iberia, west to a point on the Vermillion River at Abbeville, Vermillion Parish, La. The surveys are completed, and the grading has just begun; the contract having been let to Chris Kiel, San Antonio, Tex., and 60 or 70 scraper teams are at work. The work is very light over a prairie country, practically no grades; curvature light, nowhere exceeding 2½ degrees. The road is a local one, and will furnish rail communication for the rich valley of the Vermillion River, the business reaching the Southern Pacific lines at New Iberia, La.

Illinois Western.—Articles of incorporation have been filed in Illinois by this company. It proposes to build a railroad from a point on the Chicago, Burlington & Quincy, near Canton, southeast to the Illinois River, and also to build and acquire lines in Fulton County.

Jacksonville, St. Augustine & Halifax River.—G. S. Healy, of Seville, Fla., has the contract for about 20 miles north from Titusville, Fla., on the extension now building.

Kansas City, Nevada & Ft. Smith.—The contract of L. J. Smith, of Kansas City, for the extension from Hume, Mo., referred to last week, is for 18 miles of grading and bridge building south of that point, the work to be completed ready for track laying by Oct. 1. The grading has just been commenced. Surveys are in progress south of Clayton on the Missouri Pacific east of Ft. Scott to Pittsburgh, Kan., and as soon as the engineers complete the location, contracts will be let and the work commenced on that part of the line.

Kansas City, Pittsburgh, & Fort Smith.—The corporate name of the Pittsburgh, Columbus & Fort Smith road is to be changed as above. The company expects to secure the right of way through Congress shortly. The road is to extend from Pittsburgh through Crawford and Cherokee counties, and through the Indian Territory via Tahlequah to Fort Smith.

Lancaster, Oxford & Southern.—The grading on this road is rapidly progressing. A large portion of the road has been ballasted and some track laid from the Cecil terminus at Childs, Md., which is used to carry supplies to the 300 men at work on the road.

La Salle & Bureau County.—The line between La Salle and Ladd, Ill., about seven miles, will be opened for traffic in October, but will carry freight only. The contractors are McArthur Brothers, of Chicago. G. Weerts, of La Salle, Ill., is Secretary.

Maryland & Washington.—The President has approved the act to incorporate this company, which has been organized to build an extension of the Norfolk & Western into Washington, D. C.; the Southern terminus of the road is to be at Laurel, Prince Georges County, Md.

Mexican International.—A branch has been built from Pedrisena, Mex., to the Vilaldaina mines, five miles from the line of the Durango extension, and the owners of the mine have agreed to ship 12 loads of ore daily to Eagle Pass. This mining district is about 40 miles south of Torreon. Work on the Durango extension will be completed into the city of Durango by September.

Middlesex Valley.—Tracklaying on this road between Stanley and Naples, N. Y., 22 miles, is now about half completed, as previously reported. The grading was completed a number of years ago, and the work now in progress is being done by the Seneca Construction Co., the sub-contractors being the Drake & Stratton Co., of New York City. The road is being built from Stanley on the Northern Central road southwest to Naples Landing on Lake Canandaigua. There is one grade of 112 ft. to the mile and the only bridge work is one 100-ft. span. The road will be in operation by Sept. 1 next.

Natchitoches.—The right of way through the town of Natchitoches, La., was granted last week for the extension to the Red River, about five miles. The contract for this line is to be let at once.

New Roads.—Press reports state that a corps of engineers, in charge of E. F. Willman, of Chattanooga, Tenn., will soon commence surveying from Gadsden toward Birmingham, Ala., perhaps for the proposed extension of the Chattanooga Southern.

Herbert Bartlett has been engaged to make a survey from the Monte Cristo mining districts, near Everett, Wash., to the Silver Creek mining districts, a distance of about 30 miles through a rough country. He expects to begin the survey at once.

New York, New Haven & Hartford.—The company has decided upon an important change in the location of its line at New Haven, Conn., and the contract for the work involved was let last week. The new line is about three miles in length and the change is made for the purpose of bettering the grades and alignment, and also to escape eliminating 12 to 15 highway grade crossings in New Haven City. The bridge over the Quinnipiac River on the old line is about 1,300 ft. in length, but the river is much narrower at the point where the new location crosses, and a bridge 150 ft. long only will be required, so that a considerable length of bridge is saved. It is also proposed on the new line to build 900 ft. of tunnel, provided the rock is of the proper hardness; if not it will be a through cut, as it will require to do this only a maximum cutting of 65 ft. The new line runs over a salt marsh nearly a mile in length and 2,000 ft. of this will be trestle and a solid embankment will be built for the balance of the distance. The cost of the work will be about $430,000, and it is let to Contractor J. K. Ryan, New York City, to be completed within 16 months from date.

Owensboro Falls of Rough & Green River.—Work has been begun on the extension of the road from Fordsville south to Horse Branch, Ky., 10 miles on the Newport News & Mississippi Valley.

Pennsylvania.—About 34 miles of new road has been added to the lines controlled by this company east of Pittsburgh and Erie, for the first six months in the year on the following branches—the figures referring to miles: New York Bay Railroad, extension of branches, 1.14; Kensington & Tacony, extension, 0.87; Cambria & Clearfield, 21.78, viz.: on Whitehead Branch, 0.70, on Sutter Branch, 0.37, and on Chest Creek Branch, 19.71; Tyrone & Clearfield, Pine Run extension, 2.66; Southwest Pennsylvania, extension of branches, 1.17; West Pennsylvania, extension of branches, 1.16; Martin's Branch extension, 0.49; Tearing Run Branch of Indiana Branch, 0.96; South Fork extension, 0.21; West Jersey extension to Stone Harbor, N. J., 3.29: the total amount of new track being 33.75 miles.

Pennsylvania, Lehigh & Eastern.—President D. A. Easton, the new president of the company says that negotiations are being carried on with New York bankers which will probably result in work being commenced on the line very soon. Mr. Easton says that the delay so far in building the road, which is to extend from Tomhicken, Pa., to Port Jervis, N. Y., in the Lehigh anthracite coal region, a distance of 109 miles, has been due to a number of litigations over the old charter under which the road is to be operated, and which was acquired in 1889. These litigation, he said, are now settled. The company has spent nearly $300,000 in grading ten miles of roadbed at the eastern end. The whole route has been surveyed and rights of way secured.

Philadelphia, Reading & New England.—A press dispatch states that surveys were resumed last week for the proposed extension of the old Hartford & Connecticut Western road from Tariffville to Springfield, Mass., and that the new directors intend to carry out the original plan of building a new bridge across the Connecticut River.

Pine Bluff & Eastern.—Work will probably be commenced at once on the branch to Bayou Meta, Ark., which, as recently reported, has just been surveyed. The line is about seven miles long, with light grades and a small amount of trestle work. No contracts will be let for this work, and it is likely also that the longer extension to St. Charles, Ark., via Dewitt, about 60 miles from Swan Lake, will also be begun by the company's own men.

Pittsburgh, Cincinnati, Chicago & St. Louis.—The contract for the extension of the Cumberland branch has been let and work will begin immediately. The branch extends from New Cumberland, W. Va., along the east bank of the Ohio River and passes through rich pottery beds opposite Wellsville and East Liverpool, O. The right of way has been secured as far as this point, but it is thought that the surveys will be continued up the river. W. F. Patterson has the contract.

Potomac Valley.—This road, connecting the Western Maryland with the Baltimore & Ohio at Cherry Run, W. Va., will be opened for traffic in a few days. The first trains put on will be freight trains, but in a short time the road will be ready for passenger trains also. The stations have been established between Williamsport and Cherry Run, 14 miles, and agents appointed, so that in a short time the road will be in active operation.

Richmond, Nicholsville & Beattyville.—The stockholders of the company met at Louisville, July 30, to consider plans for the completion of the line. For this purpose $500,000 will be necessary. To secure the amount it is proposed to issue new bonds on the part already built. A committee was appointed to secure the consent of the opposing bondholders.

San Francisco & Denver.—This company filed articles of incorporation in California this week. The object is to construct a road from San Francisco Bay, in Alameda County, in a general easterly and southerly direction, to the state line between California and Nevada. The length of the proposed line is about 300 miles. The capital stock is $12,000,000, of which about $300,000 has already been subscribed.

Santa Fe, Prescott & Phœnix.—A recent report states that construction work south of Ash Fork, Ariz., is being pushed as rapidly as possible. The line has been located to Prescott, and the grading will be completed in August. Trains will be running into Prescott by September. By the time cool weather sets in the contractors will be ready to begin on the desert portion between Phœnix and Prescott. Several surveys have been made. Chief Engineer Vaughan thinks the road will be completed by January. Langtry & Sons., of Denver, have the contract.

South Bound.—It is announced that the control of this road has been secured by the Florida Central & Peninsular and that an extension will be built from Savannah to connect with the latter road at Jacksonville or near Hart's road north of Jacksonville. The surveys have already been commenced for this connecting line, which will probably follow the coast closely, going through or near Brunswick, Ga. The South Bound road was built in 1891 and extends from Savannah north to Columbia, the northern connections being the Richmond & Danville and Atlantic Coast Line. The road has a mileage of 142 miles.

Tennessee & Coosa.—Allison, Shafer & Co., of Louisville, Ky., have the contract for grading the extension south of Huntsville, Ala., and not Nichols & Co. The line is to extend to a point on the Tennessee River about three miles above Whitsburg near Hobb's Island and will be 15 miles in length. The grading has already been commenced. The work is light, the maximum grade being 52 ft to the mile and the maximum curvature six degrees. There are no iron bridges, but a number of pile trestles, none of which are over 20 ft. high.

Texas, Louisiana & Eastern.—The officers announce that the work east of Conroe, Tex., is to be vigorously resumed at once. About 20 cars of rails are expected to arrive in a few days, and the track laying will then be commenced from the end of track east to the junction with the Houston, East & West Texas road, and to the Trinity River.

Troy & New England.—New negotiations in regard to the construction of this road have begun recently, and the company expects to begin work this year. The line has been surveyed from a connection with the Troy Union road southeast to a point on the Housatonic line at the Massachusetts State line, passing through Wynanskill, Sand Lake, Nassau and other towns. The distance is 40 miles. Walter P. Warren is President and J. J. Tillinghast, is Treasurer, both of Troy, N. Y. The company has no engineer at present.

Ultima Thule, Arkadelphia & Mississippi River.—The surveys have been completed for an extension from Dalark, Ark., via Fairview and Hailey Springs, to Millville, Ark., 25 miles, and contracts for construction will be let in September. N. S. Woods, Arkadelphia, Ark., is Chief Engineer.

Union Pacific.—Work has been commenced on the grading of the branch to the Gray Creek coal mine near Trinidad, Col. J. R. De Remer, of Denver, the contractor, estimates that it will take five months to complete the work.

Wilkes Barre & Eastern.—The construction work on this road is still being pushed vigorously notwithstanding the attempt of the Philadelphia & Reading to obstruct the work near Wilkes Barre, Pa., where the new road proposes to cross the Mountain Branch of the Lehigh Valley at grade. About nine miles of grading has been completed so far.

GENERAL RAILROAD NEWS.

Atchison, Topeka & Santa Fe.—The gross earnings, operating expenses (exclusive of taxes and rentals), and net earnings of the road and its auxiliary lines for June were as follows:

	Gross earn.	Oper. expen.	Net earn.	Operated mile'ge
Atchison, Topeka & Santa Fe	$2,886,054	$2,022,690	$863,364	6,542
Roads jointly owned, Atchison, one-half	169,827	118,543	51,284	587
Total, Atchison system	$3,055,881	$2,141,233	$914,648	7,129
St. Louis & San Francisco	$557,568	$335,765	$221,803	1,328
Roads jointly owned	167,196	111,664	55,532	536
Total, 'Frisco system	$724,763	$447,429	$277,354	1,864
Aggregate, both systems	$3,780,645	$2,588,662	$1,191,983	8,993

The report for the year is as follows:

	Gross earnings.	Operating expenses.	Net earnings.	Operated mile'ge
Atchison, Topeka & Santa Fe	$34,618,755	$ 3,683,113	$10,965,642	6,537
Roads jointly owned	1,789,433	1,527,819	261,613	587
Total, Atchison system	$36,438,189	$25,210,934	$11,227,255	7,124
St. Louis & San Francisco	$7,053,228	$4,013,184	$3,040,044	1,328
Roads jointly owned	1,752,209	1,465,635	286,574	536
Total, 'Frisco system	$8,805,437	$5,478,819	$3,326,618	1,864
Aggregate, both systems	$45,243,626	$30,689,753	$14,553,873	8,988

Baltimore & Ohio Southwestern.—A mortgage has been filed in Hamilton County, O., in favor of the Farmers' Loan & Trust Co., as trustees, for $1,500,000, to secure an issue of five per cent. first mortgage bonds, payable 1942.

Concord & Montreal.—The Supreme Court of New Hampshire this week rendered an opinion in favor of the defendant in the case of Frank Jones against the directors of the railroad, brought to secure an injunction to prevent distributing among all classes of stockholders $1,200,000 of the stock voted at a special meeting of the corporation.

Central of New Jersey.—The earnings and expenses of the operation of the Port Reading lessee of this road for June were as follows.

	1892.	1891.	Inc. or dec.
Gross earnings	$1,194,099	$1,250,443	D. $56,344
Oper. expenses	694,954	692,646	I. 2,308
Net earnings	$499,145	$557,797	D. $58,652
Six months ending June 30.			
	1892.	1891.	Inc. or dec.
Gross earnings	$6,740,213	$6,505,268	I. $234,945
Oper. expenses	3,972,052	3,805,393	I. 166 659
Net earnings	$2,768,161	$2,699,875	I. $68,286

Chattanooga & Lookout Mountain.—J. B. Ragon, of Chattanooga, Tenn., Receiver, announces that this road is now being operated by H. S. Chamberlain, Receiver of the Chattanooga Union Road.

Chesapeake & Ohio.—The statement of earnings for June is as follows:

	1892.	1891.	Inc.
Gross earn	$755,387	$680,814	$74,573
Operating expen	566,337	523,142	43,195
Net earn	$189,050	$157,672	$31,378
Fiscal year:			
Gross earn	$9,004,599	$8,127,111	$877,488
Operating expen	6,731,731	6,083,519	648,212
Net earn	$2,272,868	$2,043,592	$229,276

Chicago, Burlington & Quincy.—The following is the report of earnings for June and the six months:

	1892.	1891.	Inc
Gross earn	$3,326,295	$2,609,198	$717,096
Oper. expen	2,319,805	1,660,121	659,683
Net earn	$1,006,490	$949,077	$57,413
Fixed charges	810,000	795,186	14,813
Balance	$196,490	$153,891	$42,600
Six months to June 30:			
Gross earn	$18,236,840	$14,769,586	$3,467,253
Oper. expen	12,572,117	9,751,972	2,820,145
Net earn	$5,664,723	$5,017,614	$647,108
Fixed charges	4,860,000	4,471,117	88,882
Balance	$804,723	$246,497	$558,225

Chicago, Milwaukee & St. Paul.—The following is the financial statement for the month of June:

	1892.	1891.	Inc.
Gross earnings	$2,584,778	$2,147,614	$437,164
Oper. expenses	1,783,910	1,472,997	310,913
Net earnings	$800,868	$674,617	$126,251
Twelve months, to June 30:			
Gross earnings	$32,283,507	$27,504,224	$4,779,283
Oper. expenses	20,815,004	18,366,500	2,448,504
Net earnings	$11,468,503	$9,137,724	$2,330,779

Houston, East & West Texas.—The road was sold at foreclosure at Houston, Tex., on Aug. 3, for $1,200,000 to E. S. Jamison, of New York, who owns a majority of all the bonds and is a representative of nearly all of the other bondholders. In the Civil District Court immediately afterward attorneys for the estate of Paul Bremond, a former President of the road, applied for a restraining order to prohibit Jamison from taking possession of the road.

Jacksonville, Tampa & Key West.—The United States Circuit Court has appointed a Receiver for the railroad, the object being to effect a settlement between the United States Construction Co., of Chicago, the Florida Construction Co. and the railroad company. Both construction companies are stockholders in the railroad company. The order was made in the suit brought by the majority stockholders represented by the present management, and the General Manager, R. B. Cable, was appointed Receiver.

Lehigh Valley.—Judge Schuyler in the Northampton County Court at Easton, Pa., on Aug. 1, filed his opinion in the case of E. S. Gummere and others against the company, it being a motion for a Receiver for the railroad and for a preliminary injunction restraining the Reading road from operating the Lehigh Valley. The motion was based on allegations, the purport of which was that the directors were engaged in a conspiracy to ruin that company in the interest of the Philadelphia & Reading. The Court says there is not the slightest evidence to support the allegations.

The earnings for May, 1892, were as follows:

	1892.	1891.	Inc. or dec
Gross earn	$1,567,462	$1,434,110	I. $133,352
Oper. expenses	1,042,875	1,102,204	D. 59,329
Net earnings	$524,537	$331,906	I. $192,681
Six months ending May 31:			
	1892.	1891.	Inc. or dec.
Gross earn	$8,512,469	$7,5 5,924	I. $906,545
Oper. expenses	6,701,199	6,3 2,705	I. 348,493
Net earnings	$1,811,270	$1,163,219	I. $648,052

New Haven & Derby.—An injunction was issued on Aug. 1, at the request of this railroad, restraining the Housatonic from paying the interest due on $480,000 worth of its certificates. The purpose of this injunction is to bring the matter into court. The suit is made against J. A. Bostwick, W. A. Starbuck and J. L. Maccauley and the Housatonic road. A civil suit for $700,000 damages has also been begun against the same defendants, which, it is claimed, represents the amount of illegal profits secured since the defendants secured control of the New Haven & Derby from the city of New Haven in 1887.

New York, Lake Erie & Western.—The following report shows the earnings for June and the five months of the fiscal year:

	1892.	1891.	Inc. or dec.
Gross earnings	$2,712,729	$2,584,494	I. $128,235
Operating expenses	1,794,878	1,643,556	I. 151,322
	$917,851	$940,938	I. $5,913
Less proportions due to leased lines	191,418	206,986	D. 15,568
Net earnings	$726,433	$733,952	I. $22,481
Nine months Oct. 1 to June 30:			
	1892.	1891.	Inc. or dec.
Gross earnings	$22,992,934	$21,390,723	I. $1,602,212
Oper. expenses	15,644,667	14,196,917	I. 1,447,750
	$7,348,267	$7,193,805	I. $154,462
Less proportions due leased lines	1,925,890	1,862,988	I. 62,902
Net earnings	$5,422,377	$5,330,817	I. $91,560

Philadelphia & Reading.—The following report of earnings is for the month of June, 1892, as compared with the same month of 1891:

	1892.	1891.	Inc. or dec.
Gross earn	$1,917,296	$1,820,849	I. $96,447
Oper. expenses	1,028,289	951,318	I. 76,971
Profit in operating	$889,007	$869,531	I. $19,476
Other receipts	52,622	33,386	I. 19,236
Net earn	$941,629	$902,917	I. $38,712
Expen. for perm. imp	6,605	31,105	D. 25,098
One twelfth of fixed charges	625,000	611,769	I. 13,231
	$631,605	642,872	D. $11,867
Surplus	$310,024	$260,045	I. $50,579

The gross earnings for the fiscal year were $12,000,050, an increase of $1,035,134, and the net earnings were $5,827,521, an increase of $635,521; the surplus was $1,357,202, as compared with $614,533 in 1891. The operations of the coal and iron company show a deficit for the month of $50,157, and for the fiscal year of $389,043, as compared with $53,867, and $784,867 for the respective periods in 1891.

Philadelphia, Reading & New England.—A certificate of the consolidation of the Central New England & Western Railroad with the Poughkeepsie Bridge & Railroad Co., forming the above named company, was filed with the Secretary of State at Albany, N. Y., July 28. The capital of the new corporation is $6,300,000, and the first mortgage bonds are guaranteed by the Philadelphia & Reading to the amount of $11,000,000.

Richmond & West Point Terminal.—The company defaulted in the interest payments due Aug. 1 on six per cent. first mortgage bonds. This action had been previously determined upon by the stockholders' committee. The interest upon the five per cent. bonds is not due until September.

Thompson Dean, Albert B. Boardman and Charles P. Huntington were this week appointed as a committee to represent holders of between 50,000 and 60,000 shares of stock and other securities of the system. The appointment was made in view of the default of the interest on the Terminal six per cent. bonds and the impending appointment of permanent receivers.

Valley (Ohio).—Judge Ricks in the United States Circuit Court in Cleveland has decided to allow the receivers $40,000, to be expended before Aug. 15, in the betterment of the road, and if by that date the bondholders' committee does not give assurance that the bondholders will take charge of the road and operate it then the Court will authorize the receivers to expend the remainder of the $86,000 estimated necessary to put the road in safe condition for operation.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, Aug. 3.

As was to be expected in view of the action taken by the Atchison, the $12 round trip rate for the Knights Templar excursion to Denver has now been authorized via all lines through Chicago, Peoria and St. Louis gateways. This action stirred up the Alton, which has put in one way rates during the duration of the excursion limits, as follows: Chicago to Kansas City, $6; St. Louis to Kansas City, $5; Chicago to Denver, $12; St. Louis to Denver, $12; and round trip rates of $12, Chicago or St. Louis to Denver; $8 Chicago and Kansas City, and $8, St. Louis and Kansas City. These rates will be met by all the other lines, and in addition to this the Santa Fé now claims that the one way rates cannot be withdrawn under ten days' legal notice, which will extend the time to Aug. 13 instead of Aug. 7, the going limit for the excursion rates. The return limit on the round trip rates remains Oct. 11. Upon receipt of the notice of authorization of the reduced rates between Chicago and Kansas City and St. Louis, Kansas City and Denver, Passenger Traffic Manager White, of the Atchison, charged Chairman Caldwell and the other lines with a conspiracy with the Alton, claiming that he was given no chance to object to these rates and he has filed an appeal and named E. A. Ford, General Passenger Agent of the Pennsylvania as one of the arbitrators.

Chairman Caldwell has refused to accept Mr. Ford on the ground that the Vandalia being a connection of the Illinois Central, a member of the Western Passenger Association is an interested party. The Atchison has taken an appeal from this refusal and named Vice-Chairman Donald, of the Central Traffic Association, as arbitrator for the company. In its demand for an arbitration on this point it accuses Chairman Caldwell of prostituting his office to effect the purposes of a majority against a minority. This action is not likely to facilitate the amicable adjustment of the difficulty. The Atchison has not yet replied to the demand of the association for a justification of its action in reducing the rate to Denver. There has probably been a good deal of manipulation of this business, but whether the Atchison can produce convincing proof before the association for its action remains to be seen. Failing to do so, the road will be liable under the agreement for the forfeiture of all the revenue on this business in addition to a fine. No one believes, however, that it will ever turn over the revenue to the association.

In connection with the reduced rates via the lower Missouri River crossings, the Chicago, Milwaukee & St. Paul applied to the Western Passenger Associations for authority to make a $10 rate to Omaha, Council Bluffs and Sioux City. Since making the application, however, it has announced a rate of $9.60 to Council Bluffs and Omaha and $12 to Sioux City, made on the combination of the reduced rate to Kansas City with the local rate from the Missouri River. The Burlington has also put in the $9.60 rate to Omaha.

The other eastern lines are now satisfied that the Erie, in connection with the Cincinnati, Hamilton & Dayton, is the line which is working in connection with the Vandalia in making the 20 cent. rate to the seaboard on 6th class freight. No action is likely to be taken by the association until after the meeting of the joint committee in New York to-morrow.

The eastern lines will make effective Aug. 15 the new basis of differentials on Boston over New York recently ordered by the Interstate Commerce Commission. The new differentials are: 1st class, 7 cents; 2d class, 6 cents; 3d class, 5 cents; 4th class, 4 cents; 5th class, 3 cents; 6th class, 2 cents.

The differential passenger lines east profess to have information that the St. Paul has issued instructions to its agents to route all business via the Michigan Central, Lake Shore and Pennsylvania roads, and they argue that there must be some compensation for this on the part of these lines and threaten to make trouble. The St. Paul denies that it has any such arrangement in force.

The Central Traffic lines have voted to discontinue the switching charge on exhibits to the World's Fair grounds from the junction points.

The Rock Island, in connection with the Southern Pacific, Rio Grande Western and Denver & Rio Grande, has inaugurated a new fast freight route for California fruits from the coast to Chicago.

The Western lines have voted to allow the checking of baggage to any point in Colorado on Knights Templar excursion tickets to Denver. This to avoid the handling of baggage at Denver.

Geo. H. Heafford, General Passenger Agent of the Chicago, Milwaukee & St. Paul, has given notice that he will present a resolution at the September meeting for the appointment of a joint committee to confer with a like committee from the Central Traffic and Trunk lines in regard to the making of reduced rates for the Exposition and suggesting as a place of meeting Bluffs Point, N. Y., Sept. 20, at which place and time the American Association of General Passenger and Ticket Agents will hold its meeting.

The Alton has refused to obey the order of the Board of Apportionment ordering it to divert traffic to the Rock Island.

The Freight Committee of the Central Traffic Association has voted to extend the time limit governing milling in transit of milled products of wheat delivered to the mills during July, August and September from 30 to 90 days. This does not affect the 30-day limit on milled corn, oats and barley.

Traffic Notes.

The passenger rate from Nashville to Chicago has been reduced to $11.50 instead of $13.50.

The Trunk Line Committee has authorized the roads in the Association to adopt the $12 rate from Chicago to Denver, made by the Atchison, Topeka & Santa Fé, for tickets to the Knights Templar Conclave.

Argument in the suit of the United States against the Trans-Missouri Freight Association was begun at Cheyenne, Wyo., Aug. 1. This suit was brought for violation of the Inter-State Commerce act and anti-trust law.

The Kansas City, Memphis & Birmingham on July 28 reduced rates from Memphis to New York to $20 without notice to the Memphis Passenger Association, but the cut was not met and the established rate of $28.15 has been restored.

The Rio Grande Western officers deny the report that the road has withdrawn from the Transcontinental Association, and say that they have merely refused to allow the Association to interfere with affairs of the Utah-Colorado Association.

The Chicago & Ohio Passenger Association has gone out of existence, the members having given notice of withdrawal, expiring Aug. 1. The Association has been shortlived, becoming effective May 23. Another effort to reorganize may be made. The Chicago & Ohio River Freight Association is not affected.

Chairman Walker has called a meeting of the Commissioners of the Western Traffic Association for next week in Chicago to consider the refusal of the Missouri Pacific to divert traffic to competing lines when ordered to do so. Transcontinental traffic matters will also come up for consideration.

The Burlington has given notice that it will in a few days issue a through freight tariff to all points on its lines in Illinois, instead of the old East St. Louis tariff, whereby shippers were forced to pay transfer charges to St. Louis. This tariff will include Chicago, Peoria, Galesburg, Quincy and other points.

The Philadelphia & Reading has directed that Lehigh Valley coal destined to points on the New York & Long Branch road be turned over to the Central of New Jersey for delivery, instead of to the Pennsylvania, at Phillipsburgh, N. J. Reading coal going to Northern New York points will be turned over to the Lehigh Valley instead of the Pennsylvania.

The joint conference of freight and traffic managers of the lines in the Trans-Missouri and Western Freight associations on the lumber rate situation at St. Louis resulted in the adoption of a resolution to reduce rates three cents on the 100 lbs. from St. Louis, Chicago and Northwestern points to the Missouri River. The through rates to points beyond will also be reduced three cents per 100 lbs.

The Kansas City, Fort Scott & Memphis will not require passengers to the Grand Army encampment at Washington next month to use the signature form of tickets. Chairman Caldwell has been notified that this action of the Fort Scott & Memphis will be met b the Chicago Great Western, Missouri Pacific and Atchison, and he has authorized all roads to make similar arrangements.

Chairman Vining of the Transcontinental Association has called a meeting of the traffic managers at Saratoga on Monday, Aug. 29, for the purpose of considering a proposition of the Southern Pacific to make a sweeping reduction in freight rates overland New York to San Francisco, in order to meet the cheap water competition via Cape Horn, established by the San Francisco Merchant's Traffic Association. All the water lines have reduced rates to the basis quoted by the Merchants' Clipper line.

Eastbound Shipments.

The shipments of eastbound freight, not including live stock, from Chicago by all the lines for the week ending July 30 amounted to 53,872 tons, against 62,240 tons during the preceding week, a decrease of 8,368 tons, and against 56,921 tons during the corresponding week of 1890, a decrease of 3,049 tons. The proportions carried by each road were:

Roads.	W'k to Ju'y 30.		W'k to July 23.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	7,685	14.3	7,705	12.4
Wabash	2,940	5.3	4,585	7.3
Lake Shore & Michigan South.	5,828	10.8	9,569	15.4
Pitts., Ft. Wayne & Chicago	5,241	9.8	6,341	10.2
Pitts., Cin., Chicago & St. Louis	6,876	12.8	6,472	10.4
Baltimore & Ohio	2,818	5.2	2,913	4.7
Chicago & Grand Trunk	4,656	8 6	4,915	7.9
New York, Chic. & St. Louis	5,245	9.7	6,172	9 9
Chicago & Erie	7,017	13.0	8,109	13.0
C., C., C. & St. Louis	5,666	10.5	5,479	8.8
Total	53,872	100.0	62,240	100.0

The three Vanderbilt lines carried 34.8 per cent., the two Pennsylvania lines 22.6 per cent. The lake lines carried 91,407 tons, against 89,775 tons during the preceding week, an increase of 1,632 tons.

GEO. WESTINGHOUSE, JR., President. T. W. WELSH, Supt. JOHN CALDWELL, Treasurer. W. W. CARD, Secretary. H. H. WESTINGHOUSE, General Manager.

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PITTSBURGH, PA., U. S. A.,

MANUFACTURERS OF THE

WESTINGHOUSE AUTOMATIC BRAKE

The WESTINGHOUSE AUTOMATIC BRAKE is now in use on 24,000 engines and 325,000 cars. This includes (with plain brakes) 252,000 freight cars, which is about 23 PER CENT. of the Entire Freight Car Equipment of this country, and about 80 per cent. of these are engaged in interstate traffic, affording the opportunity of controlling the speed of trains by their use on railways over which they may pass. Orders have been received for 173,000 of the Improved Quick-Action Brakes since December, 1887.

The best results are obtained in freight train braking from having all the cars in a train fitted with power brakes, but several years' experience has proven conclusively that brakes can be successfully and profitably used on freight trains where but a portion of the cars are so equipped. Below is a graphical illustration of the progress made in the application of the Automatic Brake to freight cars since its inception

Year.	No. per year.	Grand total.
1881	105	105
1882	1,085	1,190
1883	4,966	6,156
1884	15,051	21,207
1885	10,410	31,617
1886	8,946	40,563
1887	9,281	49,844
1888	27,696	77,540
1889	26,065	103,605
1890	50,502	154,107
1891	39,061	193,168

193,168 freight cars fitted with the Westinghouse Automatic Brake, which is nearly 20 per cent. of the Entire Freight Car Equipment of this country.

E. L. ADREON, Manager. JOHN B. GRAY, Agent. C. C. HIGHAM, General Supt.

THE

AMERICAN BRAKE COMPANY.

NEW YORK OFFICE, 160 Broadway, JOHN B. GRAY, Agent.

THE WESTINGHOUSE AIR BRAKE CO., Lessee,

MANUFACTURERS OF

CHICAGO OFFICE, GRAND PACIFIC HOTEL.

LOCOMOTIVE BRAKES.

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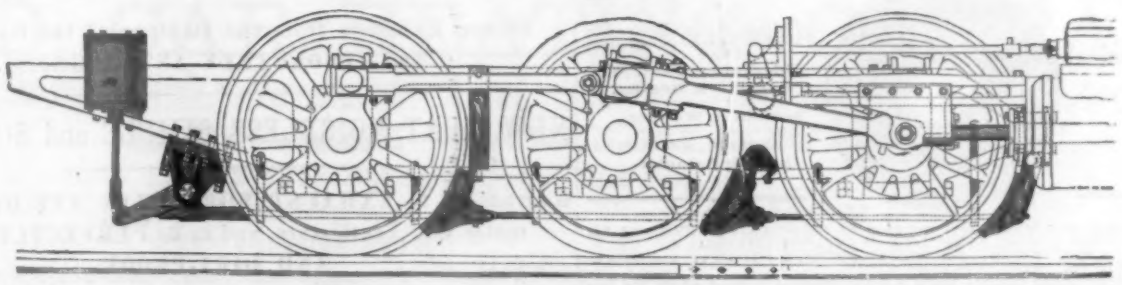
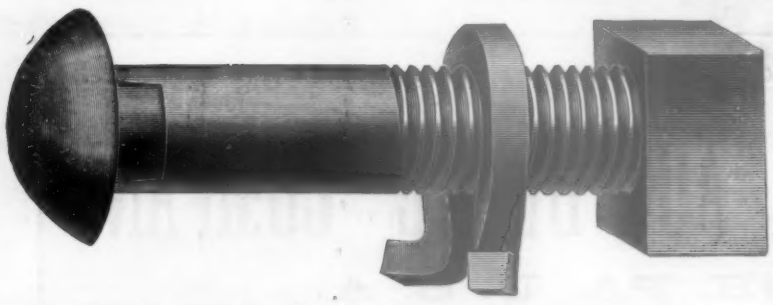


Standard Outside Equalized Pressure Brake, for two or more pairs of Drivers furnished to operate with either STEAM AIR or VACUUM.

THE "STANDARD" NUT LOCK



Manufactured under D. O. Ward's Patents by the

STANDARD NUT LOCK CO.,

NOS. 236-248 BANK ST., NEWARK, N. J.

SAMPLES FREE.

This nut lock is presented on its merits as the best and cheapest device for securing track joints.

It is a torsional loop made of good quality of tempered spri g steel, having horizontally inclined foot pieces, which are curved inward, thereby gr atly increasing the spring resistance and acting simultaneously; rests upon the base of angle bar, or underlying rail base in case of fish plate, preventing the loop portion from rotating and hammering down *thread of bolt.*

The nut lock for ¾ bolt made of ¼ in. square steel, standard pattern, yields a tension of 4,300 lbs. on the bolt, which is sufficient to reduce the wear of the bearing surfaces of the angle bars on the rails, imparting, as it does, a uniform bearing the entire length of the bar.

The "Standard" Nut Lock has sufficient elasticity to maintain a tight joint, which cannot be truthfully said of many light-weight single coil washers.

The "Standard" Nut Lock is, in its superficial form, similar to an annular coil twisted out of plain, *i. e.*, the curved shoulders or ends of the loop proper are spread in the usual manner of spring coils, at which bearing points the locking friction is equal to that of the best single coil washer, and added to this it is terminated in *inwardly curved* extensions, which must apparently furnish additional short leverage spring force of a torsional character.

Distinctive Merits of the "Standard" Nut Lock, Condensed:

Fixedness of position—cannot rotate and hammer down threads of bolt.

Cannot get one end into elongated slot of angle-bar.

Unlike any permanently placed, double washer, the Standard *is* interchangeable regardless of distance between bolts.

Cannot be put on wrong side out, as the outward projection of the foot pieces would prevent the nut being turned up.

Has more spring power directly under the nut than any two ordinary coil nut locks.

Being fixed in position, it offers double the locking friction of nut locks, which when in their *dead* "set" condition turn back with nut by the vibrative effect of passing train.

The "Standard" Nut Lock embodies the old principle of spring power improved by overcoming the objection to the double washer or nut lock, and covering the weak points of the single coil washer.

THE STANDARD COMBINATION TIE PLATE AND BRACE

POSSESSES THE FOLLOWING MERITS:

1. It prevents absolutely the canting of the rail into the tie, thereby greatly increasing the life of the tie.
2. It prevents the rails from spreading or canting over and wearing one side only.
3. The combination of the brace and plate obviates the necessity of spiking the rail and brace separately, thereby saving two spikes and securing the service of the *inside* spike for *holding* the rail; it also prevents the rail from working up and down, and laterally, thus making it impossible to wear the *neck of the spike.*
4. The plate and brace being made of malleable iron, is practically indestructible.

The tie plate and brace is especially useful for curves and guard rails, and also on bridges, whether the rail is laid on ties or on stringers. A tie plate without a brace will not save the head of the spike. A brace without a tie plate will not save the tie, and in a short time the rail will wear into the tie.

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Simple. Easily Applied. Very Effective.

THE NATIONAL LOCK WASHER

THE ONLY POSITIVE NUT LOCK IN COMBINATION WITH ELASTICITY.

Sixty Millions in Use in Railroad Track.

For Use on All Kinds and Classes of Work.

Made for all sizes of bolts.

A trial is requested.

Samples free of expense.

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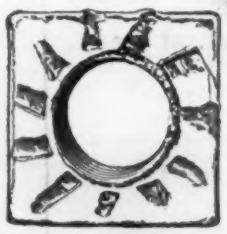

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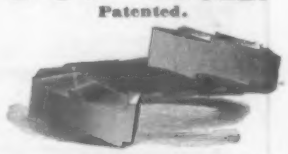
THE AMERICAN "HARVEY RIBBED" NUT LOCK.

A Resilient Spiral Spring Washer with Ratchet-Shaped Teeth.

This is a positive lock, with spring temper, and will not cut thread of nut or bolt.

Patented.



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These Nut Locks have been adopted by the New England Road-Masters, in Conventions held at Hartford, Conn., Oct. 19 and 20, 1887, and Boston, Mass., Aug. 15 and 16, 1888, as the best Nut Locks known.

Sample lots furnished for trial, free of expense, by forwarding the distance between centres of fish-plate bolts. Correspondence and orders solicited.

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Guaranteed to EXHAUST MORE THAN ANY OTHER Automatic Car Ventilators, and to Be PERFECTLY STORM AND DIRT-PROOF.

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THIS SYSTEM HAS BEEN ADOPTED BY THE U. S. LIGHT-HOUSE BOARD FOR LIGHTING BUOYS

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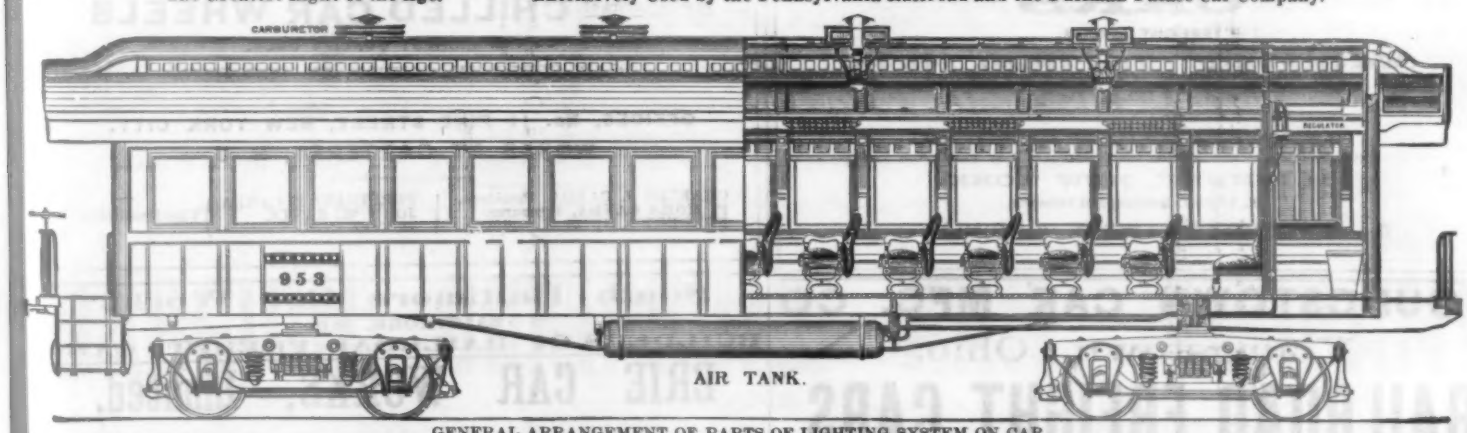
The Greatest Light of the Age. Extensively Used by the Pennsylvania Railroad and the Pullman Palace Car Company.



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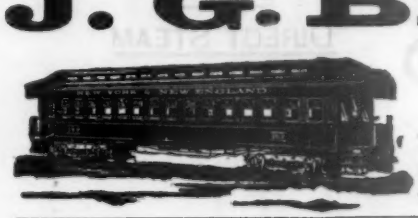

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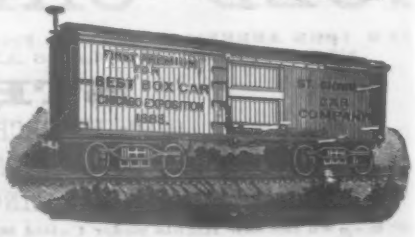

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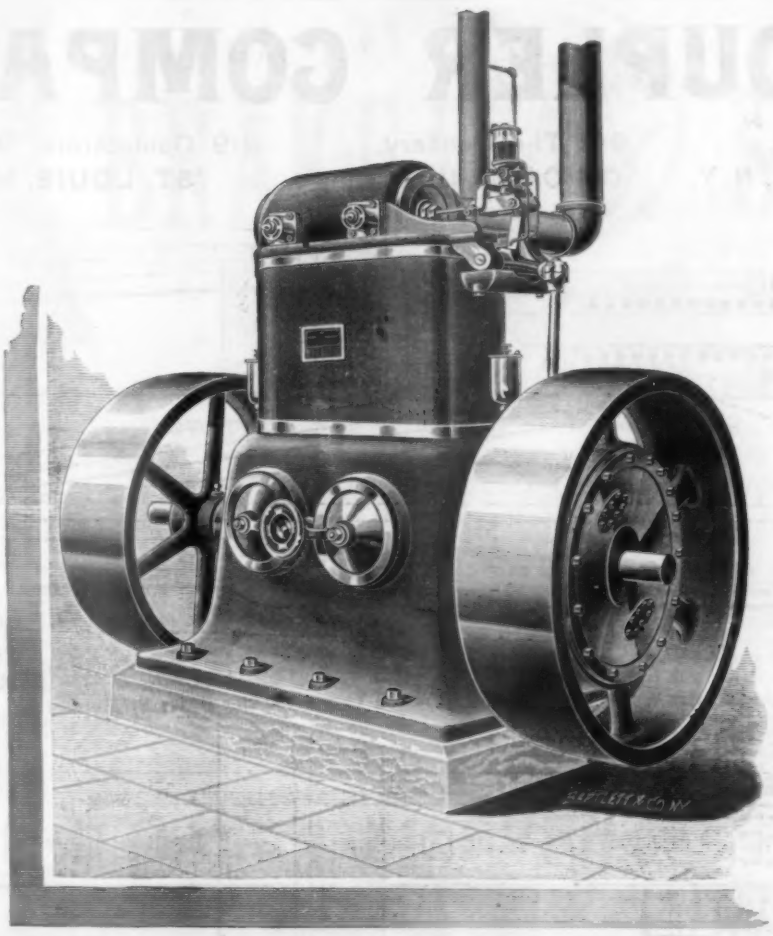

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THE COMPOUND AUTOMATIC ENGINE.
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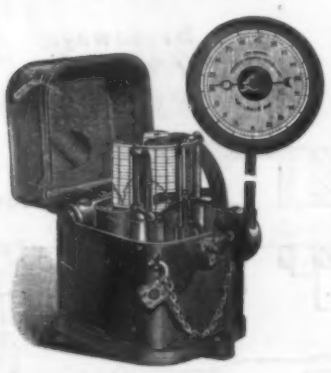

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One Whole Day at Denver.

Remember this when figuring on a trip West.

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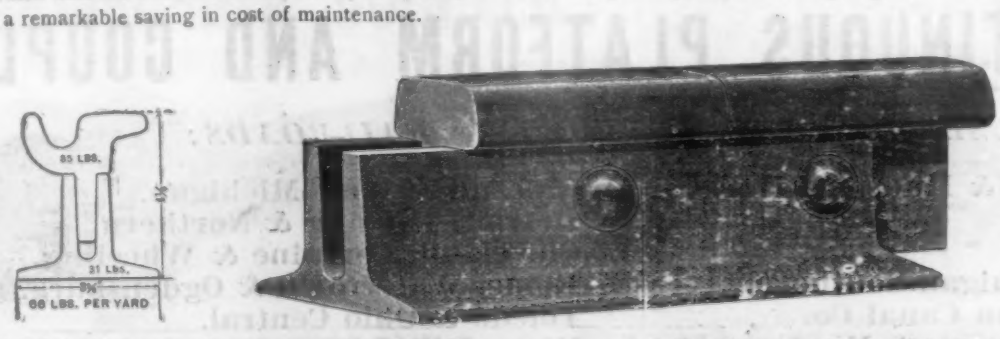
BARGION COMPOUND RAIL COMPANY

(INCORPORATED.)

The accompanying cuts show a transverse section and perspective view of the **BARGION COMPOUND RAIL** designed for steam and street roads. This rail has been in practical use by the Southern Pacific Company on their belt line in Oakland, Cal., since April 24, 1890, during which time the track has been partially tamped up but once—in January, 1891. During eight months not a moment's work was done on track, showing a remarkable saving in cost of maintenance.

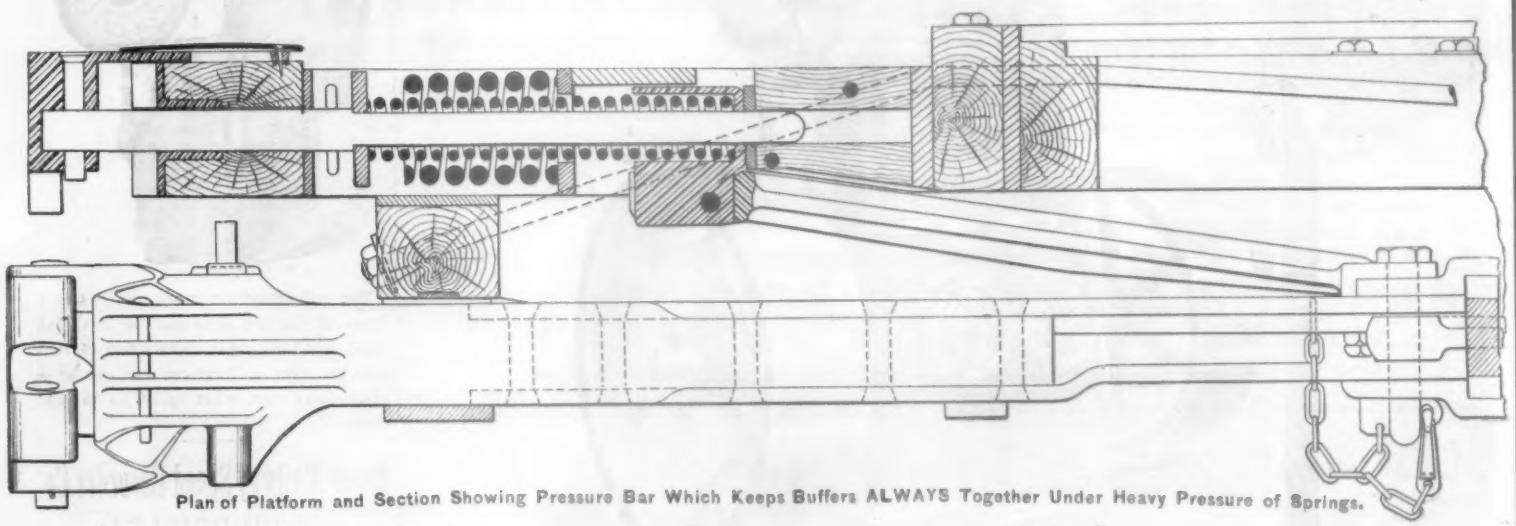


1. The cost of the rail is but a small fraction more than the T rail.
2. That there is no friction between the upper and lower parts, the contact surface after nine months' service presenting precisely the same appearance as when laid, showing not the slightest evidence of attrition.
3. That cost of renewal of this track is but one-half, as the lower part becomes a permanent part of roadbed.
4. That the cost of its maintenance is not to exceed one-tenth.
5. That there can be no sunken joints.
6. That there are no broom-ended rails.
7. That there can be no tipping of frogs.
8. That by reason of these facts the friction to rolling stock and danger of travel is reduced to a minimum.
9. That the life of the ties is greatly lengthened, as the spikes are not driven and redriven, splitting them and filling them with holes which become filled with water and hasten decay. The track is therefore much firmer.

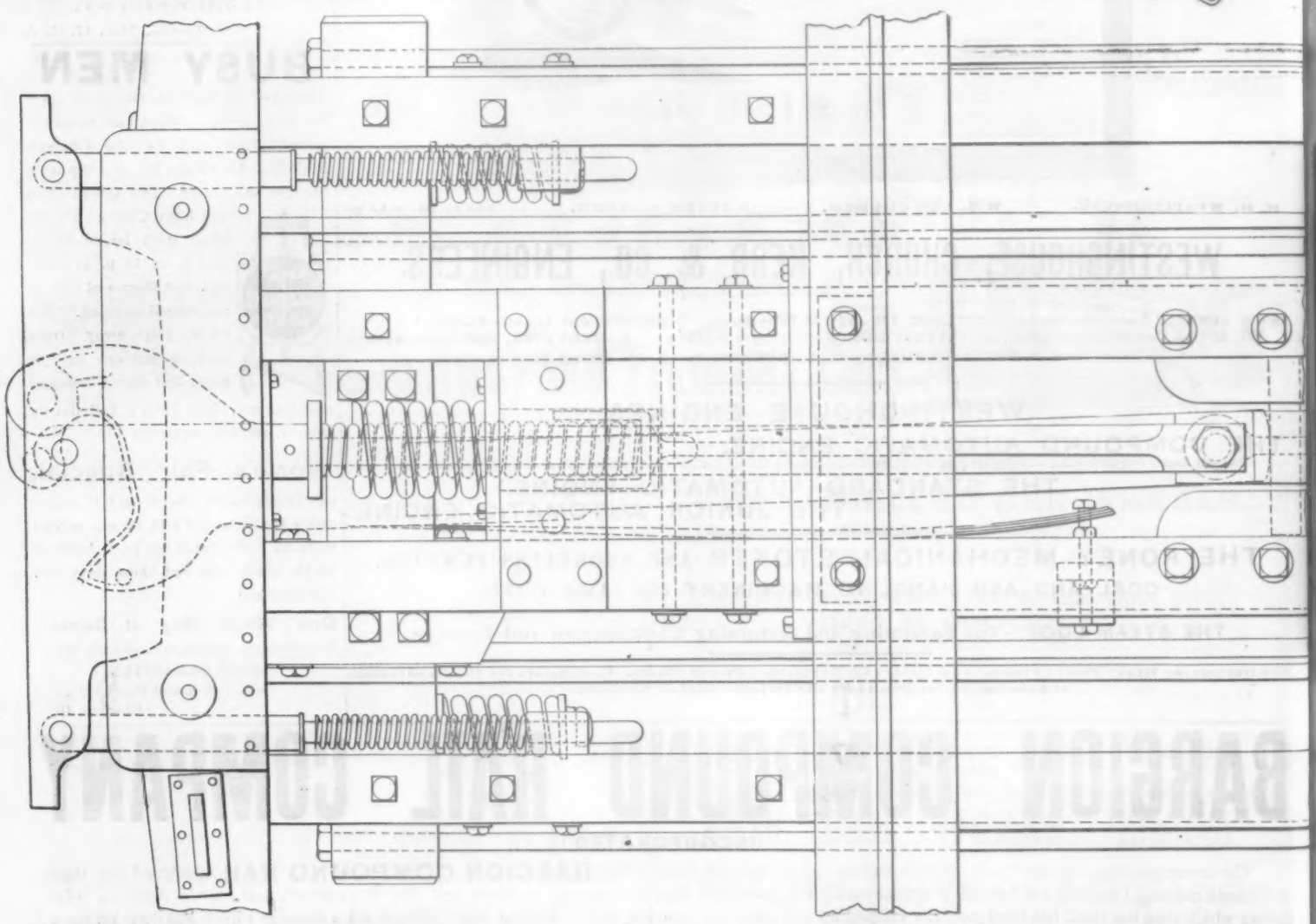
OAKLAND, CAL.

GOULD COUPLER COMPANY.

120 Broadway, NEW YORK. | Works, BUFFALO, N. Y. | 941 The Rookery, CHICAGO, ILL. | 319 Commercial Building, ST. LOUIS, MO.



Plan of Platform and Section Showing Pressure Bar Which Keeps Buffers ALWAYS Together Under Heavy Pressure of Springs.



GOULD CONTINUOUS PLATFORM AND COUPLER

IS USED ON THE FOLLOWING RAILROADS:

New York Central & Hudson River.
West Shore.
Michigan Central.
Lake Shore & Michigan Southern.
Delaware & Hudson Canal Co.
Delaware, Lackawanna & Western.
Adirondack & St. Lawrence.
Chicago & West Michigan.
Detroit, Lansing & Northern.
Cleveland, Lorraine & Wheeling.
Rome, Watertown & Ogdensburg.
Toledo & Ohio Central.
Wabash.
Ulster & Delaware.
Wagner Palace Car Co.

The GOULD PASSENGER CAR COUPLER can be USED IN PLACE of MILLER HOOK without change in MILLER PLATFORM.

BRAKE SHOES

Licensees of the CONSOLIDATED BRAKE SHOE CO.,

FOR OHIO AND WESTERN STATES: THE CONGDON BRAKE SHOE CO., Monadnock Building, Chicago, Ill.
FOR OHIO AND EASTERN STATES: (CONGDON SHOES) RAMAPO WHEEL & FOUNDRY CO., Ramapo, New York.
FOR OHIO AND EASTERN STATES: (FLANGE SHOES) RAMAPO IRON WORKS, Hillburn, New York.
FOR SOUTHERN STATES: THE ROSS-MEEHAN BRAKE SHOE FOUNDRY CO., Chattanooga, Tenn.

Shoes should be ordered in accordance with the above allotment of territory.

THE LEADING CAR SEAT OF THE TIMES.

The following Popular Trains are furnished in whole or in part with our Superb Seating:

"Gilt Edge Limited."
"Colonial Express" (Royal White Line).
"Empire State Express."
"Fast Flying Virginian.
"Royal Blue Line.
"Diamond Special."
"Red Express.'
"Royal Reading Route.

SPECIFY ONLY

"H. & K." SEATS.

"Flying Statesman."
"New York and Chicago Limited."
"Chicago and St. Paul Limited.'
"New Orleans and Chicago Limited
"Columbian Limited."
"Chicago and Nashville Limited."
"Golden Gate Special."
"Washington and Southwestern Limited."

THE HALE & KILBURN MFG. CO.,

Philadelphia
New York,
Chicago.

The Jackson & Woodin Mfg. Co.,

BERWICK, PA.

FREIGHT CARS, CAR WHEELS, CAST IRON WATER AND GAS PIPE, CASTINGS AND FORGINGS.

C. R. WOODIN, Prest. C. H. ZEHNDER, Vice Pres. and Genl. Manager.
WM. F. LOWRY Treas. FRED. H. EATON, Secretary H. F. GLENN, Genl. Supt.

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RAILWAY and MINE CARS.

Works and office on main line Pennsylvania and Philadelphia & Reading Railroads. Arthur King, Prop., Middletown, Pa.

TUBULAR JOURNAL BEARINGS

Enable railway cars to be started with but one-tenth the power required with ordinary brasses. Thirty (30) per cent. coal saving realized with trains of four or more cars. Journal heating entirely done away with by removing the cause. Cost of lubrication practically nothing, and every bearing guaranteed to yield 200,000 miles of service. Great economy and uniform reliability secured.

THE MENEELY BEARING COMPANY, West Troy N. Y.

DAVENPORT & FAIRBAIRN.

Chilled Iron Car Wheels.

Capacity, 350 WHEELS PER DAY. ERIE, PA.

Automatic Interchangeable Car Coupling Company,

[CALIFORNIA COUPLER,]

Solid Steel OR Malleable Iron, WITH *Steel Knuckle.*

Simplest, Strongest Best.

F. L. WELLS, General Agent,
116 South Clinton St. Chicago. Ill. (Home Office, San Francisco, Cal.)

"THE SURVIVAL OF THE FITTEST."

Van Dorston Cushioned Car Coupling Equipment Co.

VAN DORSTON CUSHIONED CAR COUPLER,

M. C. B. TYPE.

Lightest, Strongest and Best. Automatic Self-Opening and Self-Adjusting. Insures Safety to Trainmen. Independent Double-Acting Gravity Lock. No Slack Required to Uncouple.

Also the **Van Dorston Single, Double and Triple-Acting Cushioned Draught Gear.** Seventy-five per cent. reduction in shocks on the part of the couplers and car bodies, and consequent great economy in repairs. Increase in yard room of from 12 to 18 cars per 1,000. Correspondence respectfully solicited.

Van Dorston Cushioned Car Coupling Equipment Co., No. 305 Walnut St. Philadelphia, Pa.
EDWARD H. JOHNSTON, President.

M. C. B. Standard

Automatic Freight Car Coupler.

Locomotive and Car Axles, Coupling Links and Pins.

M. C. B. Passenger Coupler. Used in Place of Miller Hook Without Change in Platform.

New York Office: 120 BROADWAY. Chicago Office: 941 ROOKERY

St. Louis Office: 319 COMMERCIAL BUILDING.

Gould Coupler Co.

Buffalo Office and Works,

AUSTIN ST.

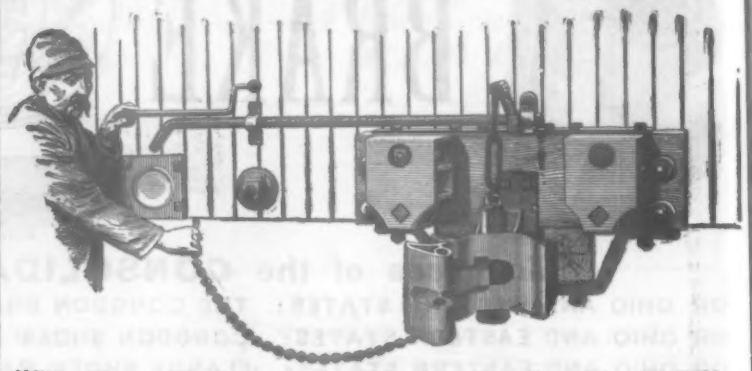
Gould Continuous Platform and Buffer.

Gould Vestibule.

STANDARD COUPLER.

(DOWLING TYPE.)

Drawhead, Malleable Iron; Knuckle, Pressed Steel; Pin, Drop Forged Steel.



With Chain Attachment for Opening the Knuckle WHEN REQUIRED.

THE STANDARD CAR COUPLING CO.,

New York Office, 45 Broadway. Chicago Office, 1018 The Rookery.

THE DREXEL COUPLER.

VERTICAL PIN LOCK. With Five Square Inches Bearing Surface.

SOLID STEEL.

M. C. B. STANDARD.

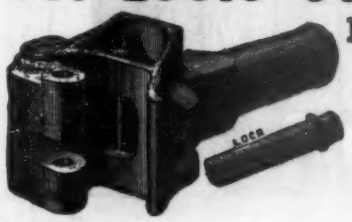
One inch additional lifting of locking pin PULLS the knuckle open. No springs. Drawbar cannot fall on track in case of pull-out.

GUARANTEED TO STAND ALL M. C. B. TESTS AS TO STRENGTH. FREIGHT AND PASSENGER COUPLERS.

DREXEL RAILWAY SUPPLY CO., The Rookery, Chicago.

THE DREXEL JOURNAL BOX LID. Pressed Steel. 90,000 Sold Since March 1, 1891.

ST. LOUIS STEEL COUPLER,



FREIGHT, PASSENGER AND TENDER COUPLERS.

ST. LOUIS CAR COUPLER CO., ST. LOUIS, MO.

WM. V. WOLCOTT, President. HENRY O'HARA, Vice-Prest. GEO. A. BANNANTINE, Secretary.

SMILLIE DOUBLE LOCK COUPLER.

TENSILE STRENGTH (Fairbank's Test) 139,640. DROP TEST 700 lbs. hammer dropped 18 ft. 22 times failed to break the knuckle.

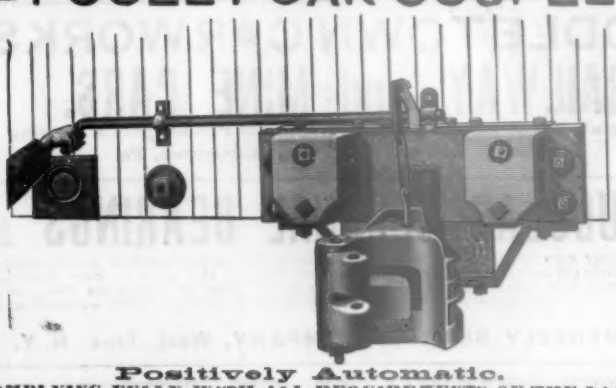
Direct drop of full sized pin makes a double lock formed by draw bar at "C" and Pin "D." Equally strong if pivot pin "A is lost. Should pin be lost, use any link—no chains being required. The strongest Knuckle and Coupler known. Cannot be unlocked by any jolt of the cars. Couples with all M. C. B. types. The locking pin drops behind the step on rear of Knuckle "K," and keeps the knuckle always open when cars are separated. Removing the pivot pins, 33 loaded gondola cars were drawn from Paterson, N. J., to West End (18 miles), the pull being entirely on the DOUBLE LOCK.

The drawbar is Malleable Iron. The Knuckle Pivot and Locking Pins steel.

THE SMILLIE COUPLER & MFG. CO.,

52 Broadway, New York. Works, 91 Clay St. Newark, N. J

THE POOLEY CAR COUPLER.



Positively Automatic.

COMPLYING FULLY WITH ALL REQUIREMENTS OF THE LAW.

SIMPLE. STRONG. EFFECTIVE

PRATT & LETCHWORTH, MANUFACTURERS, BUFFALO, N. Y.

TROJAN CAR COUPLER.

M. C. B. TYPE.

THE STRONGEST AND THE ONLY SAFETY COUPLER.

The knuckle may be thrown open for coupling by the hand-rod at the side of the car, rendering it unnecessary for trainmen to go between the cars to open the knuckle. The action is positive, and not dependent on springs or gravity.

The lock has a bearing of four square inches on the knuckle.

N. O. Olsen, Engineer of Fairbanks & Co.'s testing department, says: "IT IS THE STRONGEST COUPLER NOW IN THE MARKET

THE TROJAN CAR COUPLER CO.,

New York Office, 11 Pine street. TROY, N. Y.

IMPROVED ENGINE SPRINGS

EVERY SPRING GUARANTEED.

SEND FOR ILLUSTRATED CIRCULAR.

CHARLES SCOTT SPRING COMPANY

PHILADELPHIA.

945 Rookery, Chicago, Ill. Southern Hotel, St. Louis

PASSENGER, FREIGHT, TENDER.

HINSON COUPLERS

The Hinson Car Coupler Co.

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31 & 33 B'way N. Y.

THE JANNEY FREIGHT CAR COUPLER

THE McCONWAY & TORLEY CO.

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48th ST. & A. V. R. R. PITTSBURGH, PA.

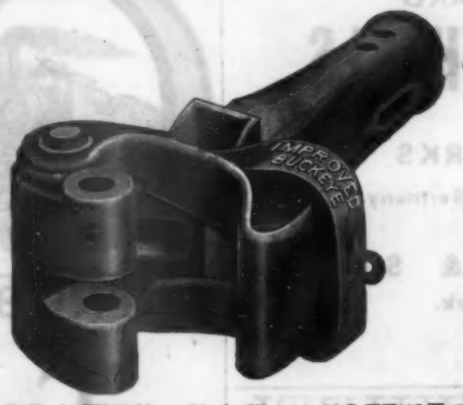
Agents & Manufacturers For

THE JANNEY-HICN COMPANY

THE BUCKEYE COUPLER.

W. F. GOODSPEED, President. R. M. ROWND, Vice-President. S. P. PEABODY, Secretary and Treasurer.

Master Car Builders' Standard in every particular. Combines the greatest obtainable strength and simplicity. Only Three Parts. Positive acting gravity lock and positive mechanical opening of knuckle. Absolute Central draft. Same movement that raises the lock throws open the knuckle.



Sold with a GUARANTEE to Stand the Proposed M. C. B. Drop and Pulling Tests.

Adopted as Standard by Several Leading Railroads After Severe Tests and Long Trials.

E. J. EAMES, Western Agent,
Phenix Building, CHICAGO, ILL.

THE BUCKEYE AUTOMATIC CAR COUPLER CO., Columbus, Ohio.

JOHNSTON CAR COUPLING COMPANY

204 WALNUT PLACE, PHILADELPHIA, PA.

The Lightest, Simplest and Least Expensive Coupler in the Market.

WEIGHT 180 POUNDS.

MEETS ALL THE REQUIREMENTS OF THE M. C. B. LINES AND TESTS.

LOCKING DEVICE SIMPLE, DURABLE AND EFFECTIVE

It Has but Four Parts and Cannot Be Opened by Accident.

KNUCKLE OPENS AUTOMATICALLY.

THE BALTIMORE CAR WHEEL COMPANY

MANUFACTURERS OF

CHILLED WHEELS OF ALL PATTERNS AND SIZES FOR EVERY SERVICE, AND WITH OR WITHOUT AXLES.

CAPACITY, 400 WHEELS PER DAY.

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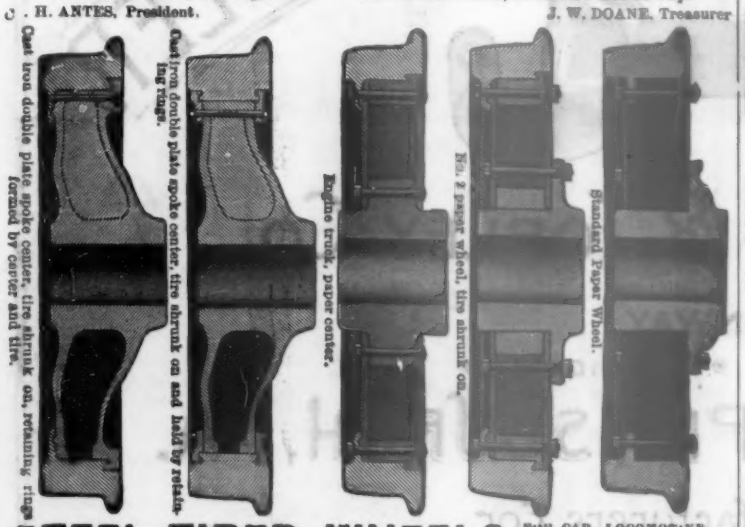
OFFICE AND WORKS: Fulton Junction, Baltimore, Md.

Works, Hudson, N. Y. **ALLEN PAPER CAR WHEEL CO.** Works, Pullman, Ill.

General Office, Chicago, Ill. New York Office, 31 and 33 Broadway.

C. H. ANTES, President. J. W. DOANE, Treasurer


Cast iron double plate spoke center, tire shrunk on, retaining rings forced by center and tire.
Cast iron double plate spoke center, tire shrunk on and held by retaining rings.
Engine truck, paper center.
No. 2 paper wheel, tire shrunk on.
Standard Paper Wheel.

STEEL-TIRED WHEELS FOR CAR, LOCOMOTIVE AND TENDER TRUCKS

WM. MARTIN, Pres. FRANK E. SHAW, V.-Pres. and Treas. W. E. CANDEE, Sec'y.

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MARTIN ANTI-FIRE CAR HEATER CO.

DUNKIRK, N. Y.

PRONOUNCED THE BEST. | Manufacturers of

MARTIN'S COMBINATION CAR HEATER, DeKALB VENTILATING CAR WINDOW, AUTOMATIC LIGHT EXTINGUISHER, AUTOMATIC STEAM TRAP, REDUCING PRESSURE and OTHER VALVES.

Especially adapted to STEAM CAR HEATING. The only reliable Automatic Thermostat for car service. Wholesale Dealers in

BRASS AND IRON STEAM FITTINGS, STEEL AND WROUGHT IRON PIPE.

THE KRUPP SYSTEM

OF

AMERICAN STANDARD

STEEL-TIRED WHEELS

CAST-STEEL WORKS

Of FRIED. KRUPP, Essen, Germany.

REPRESENTED BY

THOMAS PROSSER & SON

15 Gold Street, New York.

CUSHION CAR WHEEL

RECORD 40,000 MILES. 1-16 INCH WEAR.

Simplicity.
Durability.
Economy.
Elasticity.
Safety.
Noiseless.

For Coaches, Locomotives and Tender Trucks on Elevated, Electric and Street Railroads. Two pieces only. Centre never removed from axle. Tire renewed in any shop. Cushion absorbs all vibrations or undue stress and thrusts. One-half more mileage than any other wheel made.

SEND FOR CIRCULAR.

CUSHION CAR WHEEL CO. { INDIANAPOLIS, IND., and GRAND PACIFIC HOTEL, CHICAGO.

LOBDELL CAR WHEEL CO., WILMINGTON, DEL.

Established 1836.

Double Plate, Single Plate AN Hollow Spoke WHEELS FOR Broad and Narrow-Gauge Cars Engines and Tenders.

Also OPEN AND Solid Plate STREET CAR WHEELS Either in the Rough or Fitted on Axles.

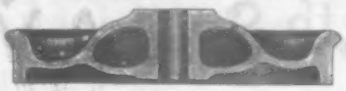
CAPACITY, 500 WHEELS PER DAY.

TAYLOR IRON & STEEL CO.

SUCCESSORS TO "THE TAYLOR IRON WORKS,"

HIGH BRIDGE, NEW JERSEY, on line of C. R. R. of N. J.

NEW YORK OFFICE: ROOM 505 CENTRAL BUILDING, LIBERTY AND WEST STS.



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Steel Tired Car Wheels, Chilled Iron Car Wheels, Car and Locomotive Axles, Iron and Steel Forgings.

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MERCHANT IRON,

Draw-Bars, Links and Pins, Follower Plates, Railroad Forgings, Arch Bars, Splice Bars, Track Bolts; Bridge Rods, with Plain or Upset Ends, All Sizes.

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Locomotive and Car-Wheel

TIRES.

OFFICE: 220 SOUTH FOURTH ST

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PICKERING SPRING CO., Limited

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Railway Springs of Every Description

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THE WASHBURN CAR-WHEEL COMPANY

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CRUCIBLE

STEEL-TIRED WHEELS,

For Parlor and Sleeping Cars, Passenger Coaches, Locomotive and Tender Trucks.

CAST-IRON CENTRES

WELDED TO

Hammered & Rolled Crucible Steel Tires.

THE JERSEY CITY WHEEL FOUNDRY AND MACHINE WORKS

HIGH GRADE CHILLED CAR WHEELS

ALL WHEELS GUARANTEED TO STAND 60,000 LBS.

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Wood-Wheel Hand and Push CARS

WITH ROLLED STEEL TIRE.

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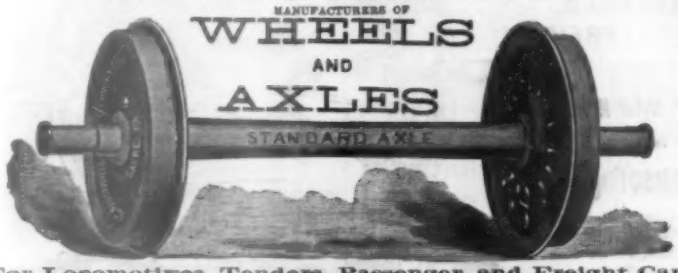
CHICAGO OFFICE: Room 607, 120 Jackson Street

THE CAYUTA WHEEL AND FOUNDRY CO AND SAYRE STEAM FORGE

MANUFACTURERS OF

WHEELS AND AXLES



For Locomotives, Tenders, Passenger and Freight Cars.

RAILROAD CASTINGS AND HEAVY FORGINGS.

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SAYRE PA.

THE SOLID STEEL CO

ALLIANCE, OHIO.

STEEL CASTINGS

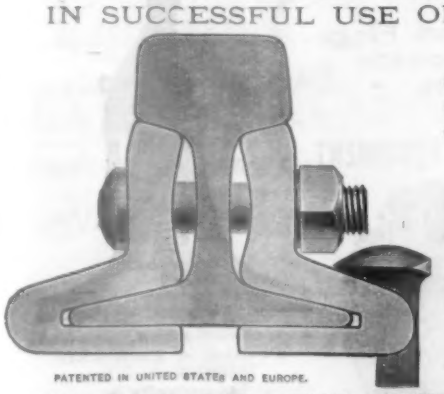
LOCOMOTIVE CASTINGS, SUCH AS DRIVING BOXES, CROSS HEADS, ROCKER SHAFTS, PISTONS, FOLLOWERS, etc.

BRAKE STOCKS, CAR COUPLERS, DRAW-BARS, ETC.

The Coming Joint for Steam Railroads,

ELECTRIC and CABLE STREET RAILWAYS.

IN SUCCESSFUL USE ON 48 ROADS.



PATENTED IN UNITED STATES AND EUROPE.

By its use the rail is made as strong at the joint as it is at the centre of the rail as it lies in track.

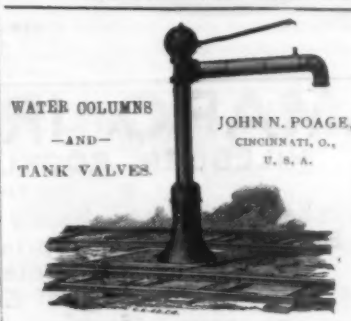
It is simple and easily applied, and has always given satisfactory results.

It is the safest joint to use, and cheaper in the long run than the angle bar.

It will increase the life of the rail over 25 per cent.

CONTINUOUS RAIL JOINT COMPANY OF AMERICA,

Broad and Market Sts., Newark, N. J.



WATER COLUMNS —AND— TANK VALVES.

JOHN N. POAGE, CINCINNATI, O., U. S. A.

ROYAL (FIRE) INSURANCE COMPANY

Of Liverpool, England.

ESTABLISHED 1845.

HEAD OFFICE METROPOLITAN DISTRICT

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TRUSTEES:

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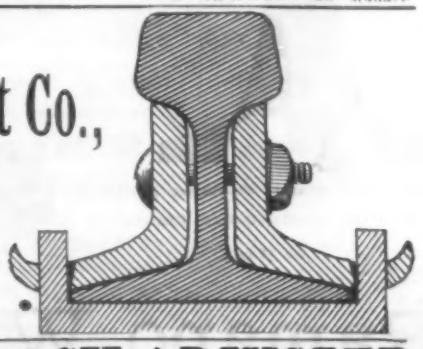
E. F. BEDDALL, Manager.

W. W. HENSHAW, Asst. Manager.

Eno Rail Joint Co.,

NEWARK, N. J.



THE HINCKLEY AUTOMATIC BRAKE-SLACK ADJUSTER

Simple. Compact. Effective.

Piston of Air Brake Cylinder is automatically kept at any desired uniform stroke, resulting in full, effective piston pressure at all times.

ONE ADJUSTER PER CAR.

Uniformly applicable to any form of brake rigging, Passenger or Freight, whether brakebeams are outside or inside hung, etc., etc.

Illustrated Catalogue, with records of performance in service, upon application.

THE HINCKLEY BRAKE COMPANY TRENTON, NEW JERSEY.

THE

FONTAINE CONTINUOUS RAIL CROSSING

(For Description See Railroad Gazette of Dec. 18, 1891)

THE MOST ECONOMICAL. ABSOLUTE SAFETY.

HIGH RATE OF SPEED WITHOUT ANY JAR.

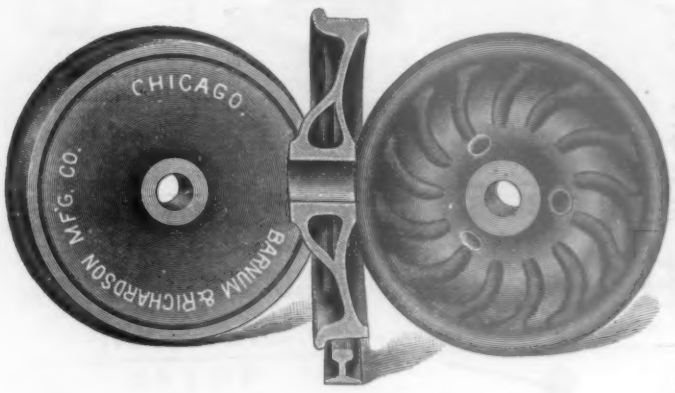
CHICAGO OFFICE: Room 320, Home Insurance Office, 205 La Salle Street. | NEW YORK OFFICE: Room 615, Mutual Life Building, 32 Nassau Street.

WORKS AND MAIN OFFICE:

FONTAINE CROSSING CO., DETROIT, MICH.

BARNUM & RICHARDSON MFG. CO.,

Office, 64 South Jefferson St., CHICAGO, ILL



—MANUFACTURERS OF—

LOCOMOTIVE, PASSENGER, FREIGHT

—AND—

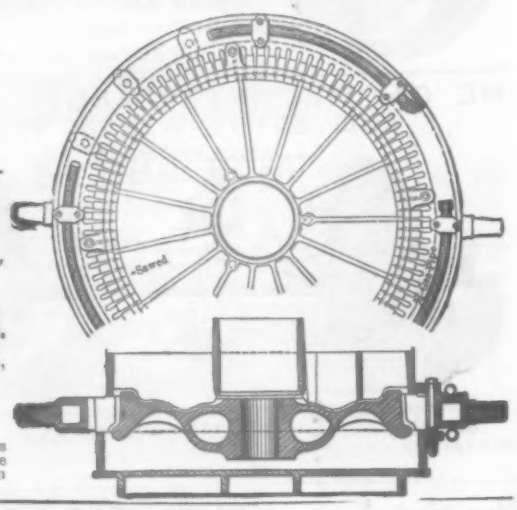
STREET CAR WHEELS,

IN THE

Bar Contracting Chills.

Salisbury Charcoal Pig Iron, Street Railway Curves, Crossings, Frogs and Switches.

Machinery and Heavy Castings of all descriptions. Wheels are made perfectly cylindrical, uniform in chill, and with treads ground.



RAMAPO IRON WORKS

HILLBURN ROCKLAND COUNTY, N. Y.

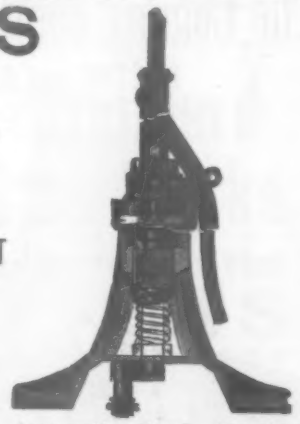
MANUFACTURERS OF

Switches, Automatic Safety Switch Stands, Yoked Frogs Bolted Plate and Spring Rail Frogs, Automatic Distant Signals Interlocked with Switches, Crossings of Every Description.

LIGHT AND HEAVY CASTINGS AND GENERAL TRACK EQUIPMENT

Automatic Stand, Showing Position of Parts while being Thrown by Hand

RAMAPO "YOKED FROG."



Automatic Stand, Showing Position of Parts while being Thrown Automatically by Train.

Ramapo Wheel & Foundry Company

MANUFACTURE

CHILLED IRON CAR WHEELS

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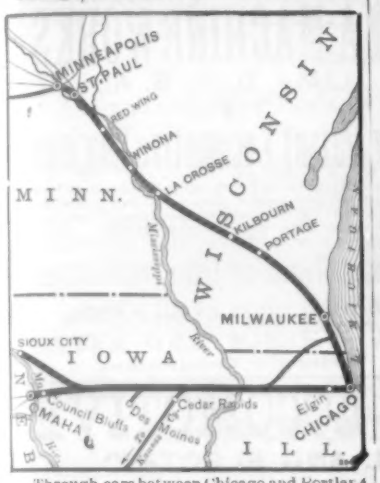

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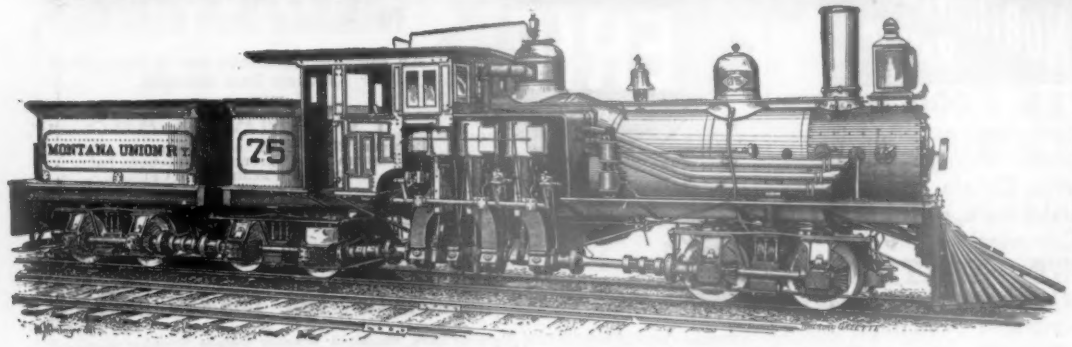

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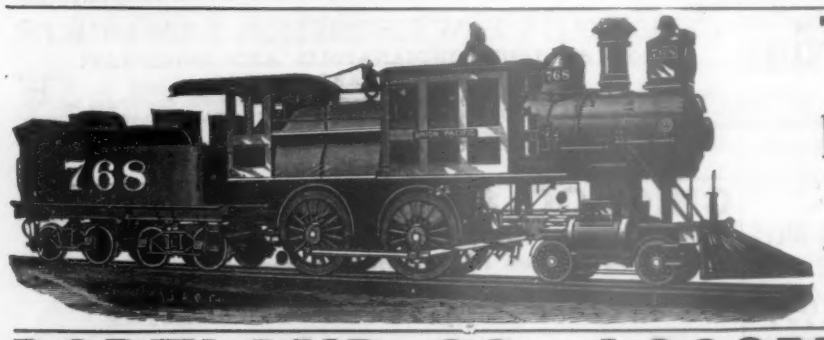

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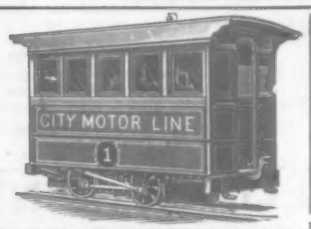

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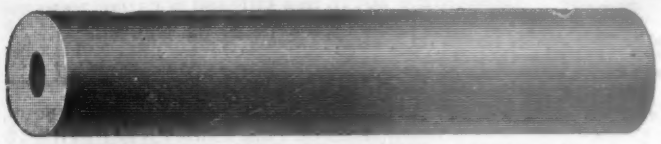

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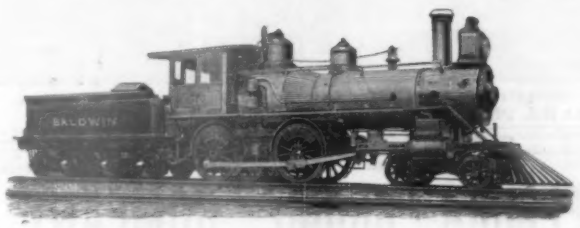

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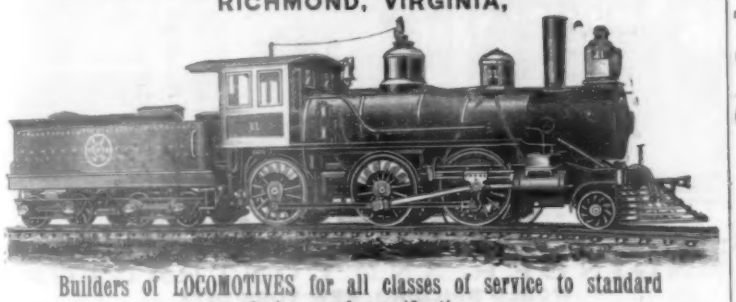

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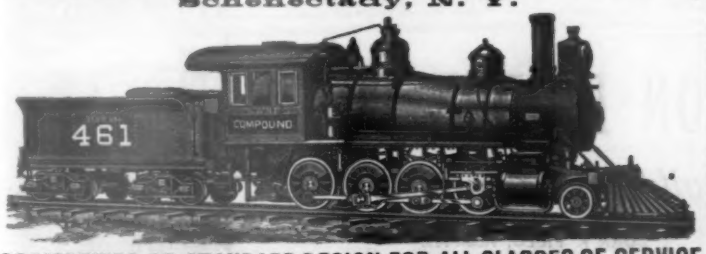

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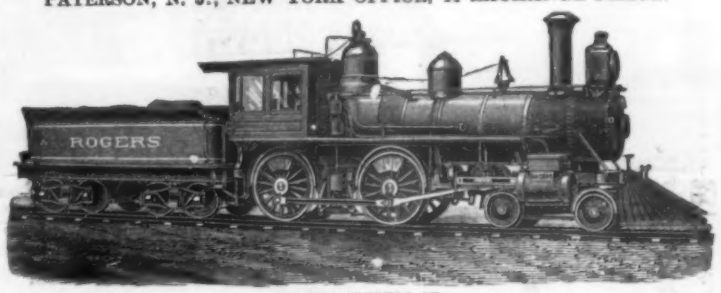

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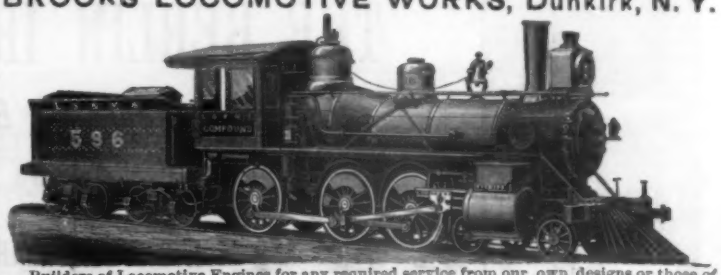

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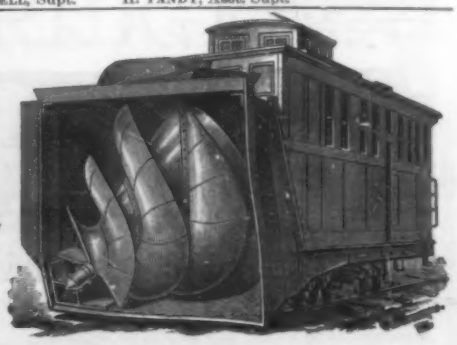

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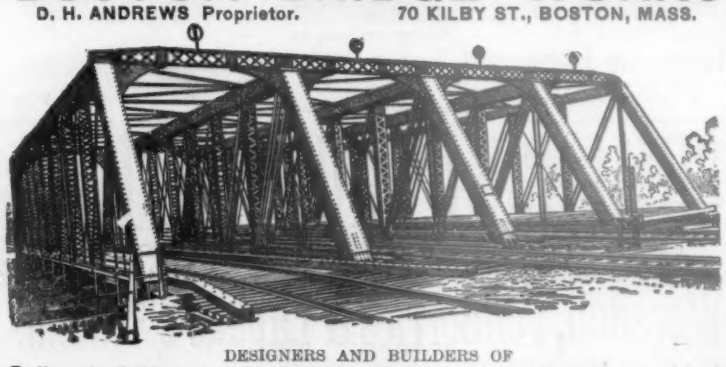

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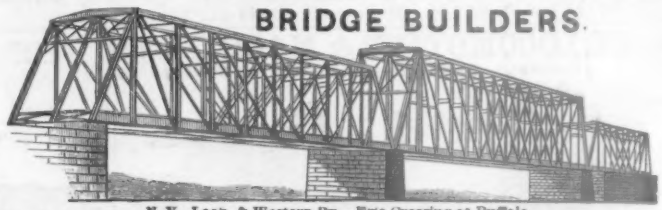

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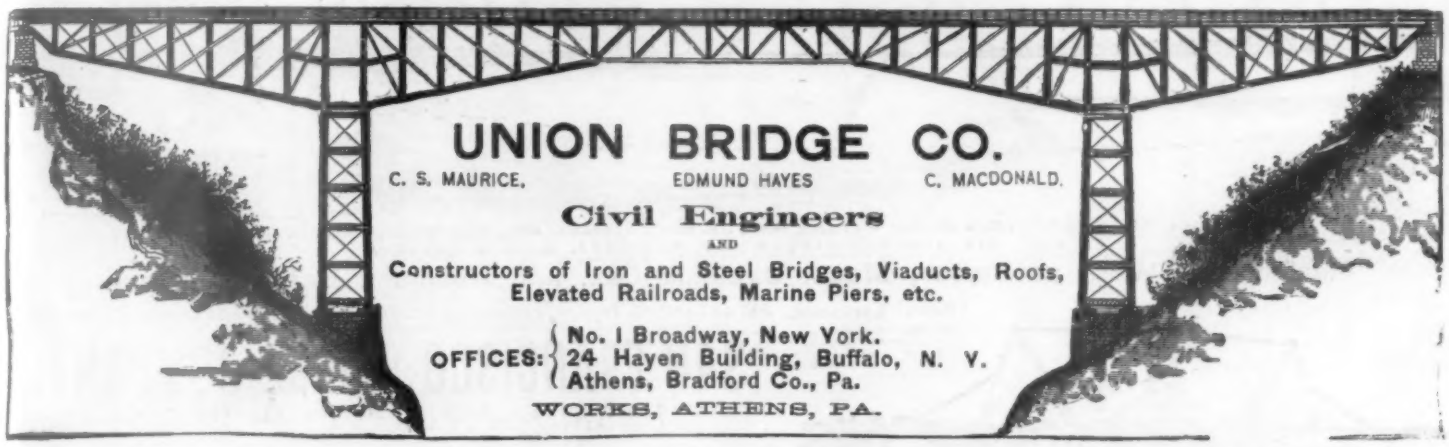

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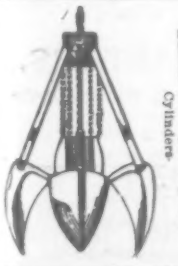

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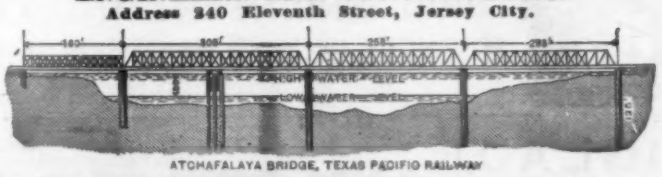

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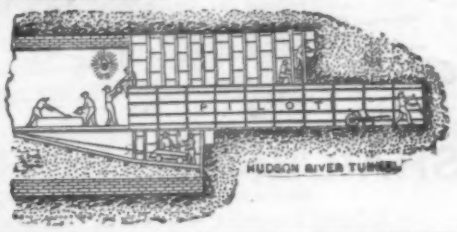

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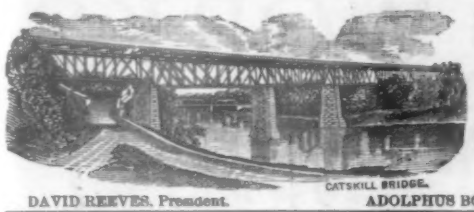

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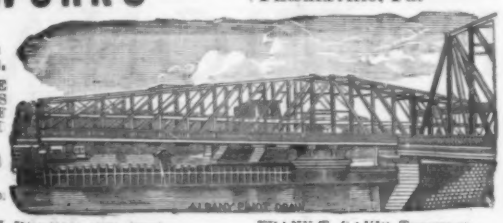

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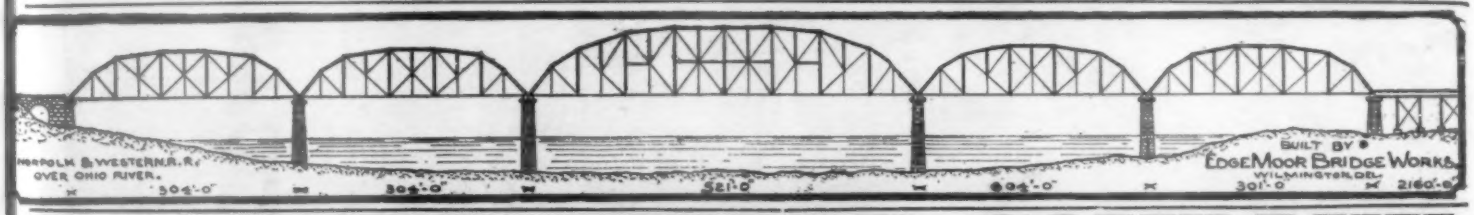

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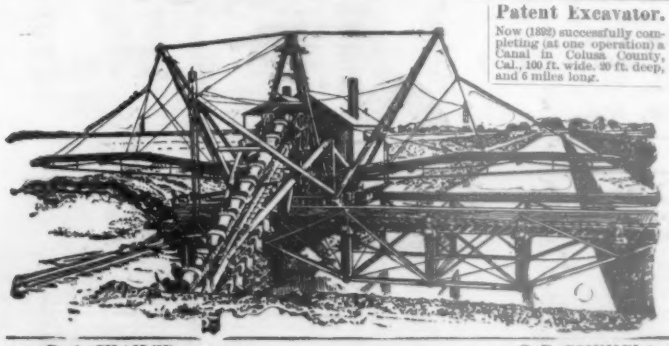

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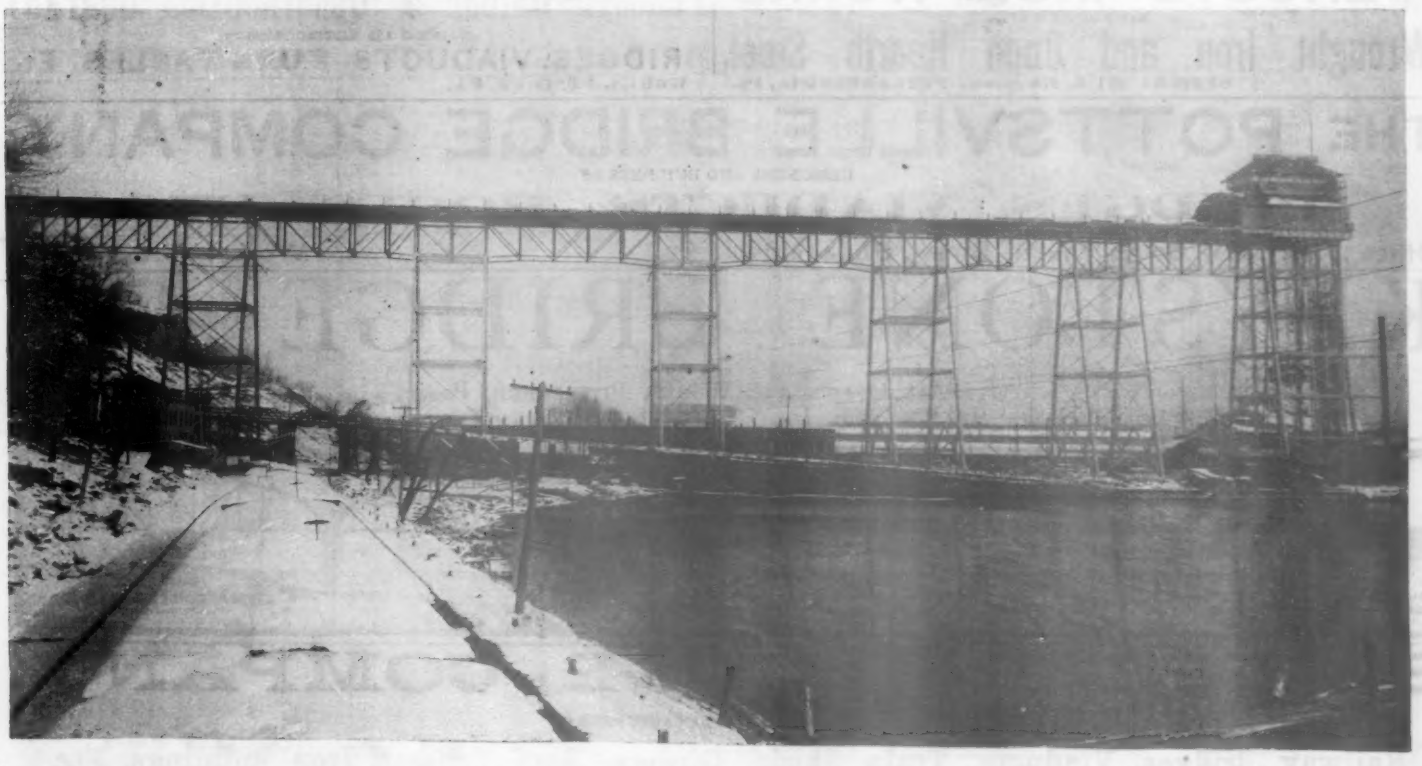

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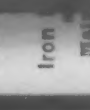

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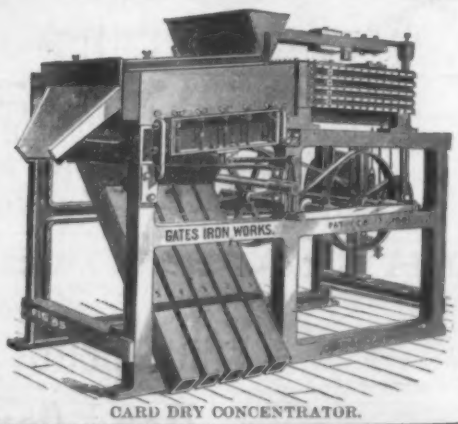

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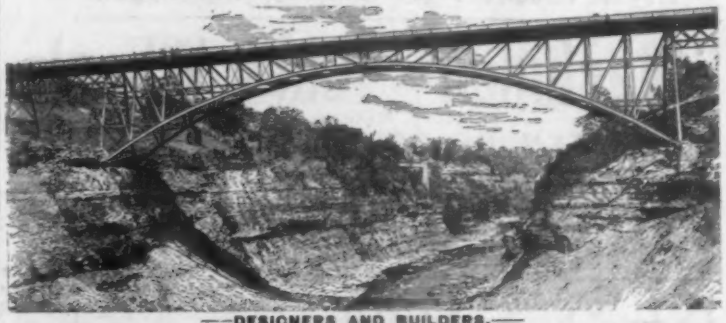

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